American Annual of Photography

1918

Sept. 18, 1917

Ansco V-P No. 0
(Focusing model)

Specifications		V-P No. 0
	Size of picture	$1\frac{5}{8} \times 2\frac{1}{2}$
	Size of film	2C
	Dimensions	$1 \times 2\frac{1}{2} \times 5$
	Focal length of lens	$3\frac{3}{8}$ in.
	Weight	$10\frac{1}{2}$ oz.
	Price, Modico Anastigmat lens, F 7.5, Actus shutter and black carrying case	$16.00
	Ansco Anastigmat lens, F 6.3, Extraspeed Bionic shutter and black carrying case	25.00
Extras	Sole leather holster, black or tan leather	$1.75
	Ansco Portrait Attachment	.50
	Auxiliary Tripod Top	.50
	Eight-exposure film (2C)	.20

The foregoing prices are subject to change without notice

Ansco V-P No. 2

Specifications

	V-P No. 2
Size of picture	$2\frac{1}{4} \times 3\frac{1}{4}$
Size of film	4A
Dimensions	$1\frac{1}{4} \times 2\frac{7}{8} \times 7$
Weight	19 oz.
Focal length of lens	$3\frac{1}{2}$ in.
Price, Modico Anastigmat lens, F 7.5, Extraspeed Bionic shutter	$18.50
Ansco Anastigmat lens, F 6.3, Extraspeed Bionic shutter	27.50

Extras

Sole leather holster, black or tan leather	$2.00
Carrying case, with shoulder strap	1.00
Ansco Portrait Attachment	.50
Auxiliary Tripod Top	.50
Six-exposure film (4A)	.20

The foregoing prices are subject to change without notice

Ansco V-P Speedex No. 3

Specifications

	V-P Speedex No. 3
Size of picture	$2\frac{1}{4} \times 3\frac{1}{4}$
Size of film	4A
Dimensions	$1\frac{1}{4} \times 2\frac{7}{8} \times 7$
Weight	19 oz.
Focal length of lens	$3\frac{1}{2}$ in.
Price, Ansco Anastigmat lens, F 5, Acme Speedex shutter	$47.50
Ansco Anastigmat lens, F 6.3, Acme Speedex shutter	40.00
Modico Anastigmat lens, F 7.5, Acme Speedex shutter	31.00

Extras

Sole leather holster, black or tan leather	$2.00
Chamois-lined leather carrying case with shoulder strap, lock and key	4.00
Ansco Portrait Attachment	.50
Six-exposure film (4A)	.20

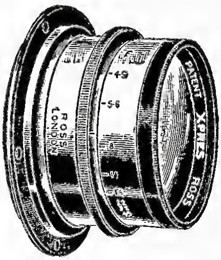
The foregoing prices are subject to change without notice

ANSCO COMPANY, Binghamton, N. Y.

NEW ROSS LENSES

Cover Perfectly with Brilliant Definition and Are Extremely Rapid. Adaptable to All Modern Cameras.

ROSS' New "XPRES" PATENT



Working at full aperture.
For Studio Portraits and Groups and for all work requiring extreme rapidity.
Exceptionally Brilliant.
Definition to margins.

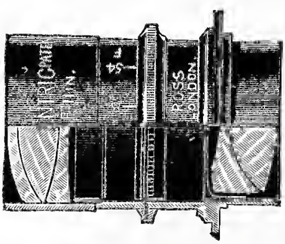
F/4-5

Full Aperture

12-inch "XPRES"
THE LENS
for Cabinets and Whole-plate Groups.
Admirable for Reflex and Hand Cameras.

F/4-5

ROSS' New "TELECENTRIC" Patent



Large Image with Short Camera Extension.
Critical Definition at full aperture.
Shortened Exposures Ideal for Sporting Events.

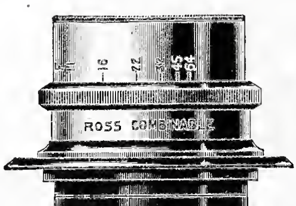
F/5-4

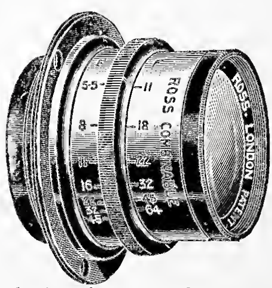
Two Series

Inexpensive Studio Lens.
Covering to margins.

F/6-8

ROSS' New "COMBINABLES" Patent





F/11

Singles and Doublets

F/5-5

The Singles are the most Rapid Single Anastigmats, perfectly corrected, giving Critical Definition to the margins without distortion—For Landscapes, Large Portraits, and Groups. The Universal Doublets are specially suitable for Portraits and Groups in the Studio and all outdoor Photography, Interiors, Copying, etc.

For Full Particulars see Ross' New Price List, sent free on Application.

American Agents

GEORGE MURPHY, Inc.

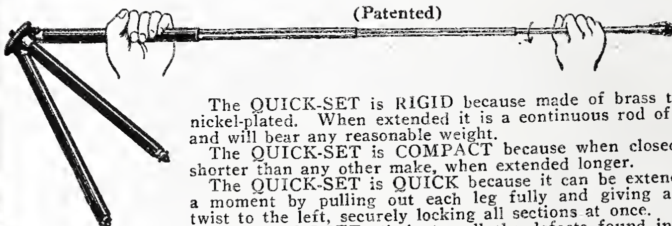
57 East Ninth Street **NEW YORK**

THE QUICK-SET METAL TRIPOD

NICKEL-PLATED

Embodying all the Features of a Good Tripod
RIGID When Extended
COMPACT When Closed
QUICK When Operated

(Patented)



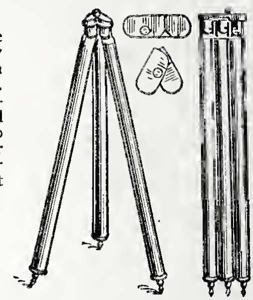
The QUICK-SET is RIGID because made of brass tubing, nickel-plated. When extended it is a continuous rod of metal and will bear any reasonable weight.

The QUICK-SET is COMPACT because when closed it is shorter than any other make, when extended longer.

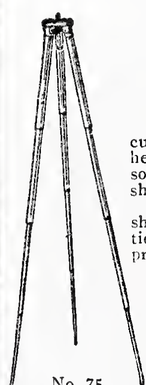
The QUICK-SET is QUICK because it can be extended in a moment by pulling out each leg fully and giving a short twist to the left, securely locking all sections at once.

The QUICK-SET eliminates all the defects found in other makes of tripods. It has no buttons or pins, and the legs cannot become loosened.

The QUICK-SET TRIPOD, where fastened to the head, is reinforced by a pinion, making it absolutely unbreakable. However, in case of accident any section of the legs can readily be replaced at slight expense. Again, the QUICK-SET does away with the objectionable buttons and springs used on other makes of metal tripods. It has no projecting parts, and the lock is so constructed that it is impossible to slip or unlock under pressure. Another feature of superiority over other metal tripods is the adjustable one; can be locked at any section, thereby shortening it, if needed.



No. 60



No. 75

Nos. 51 to 53, inclusive, are made with the legs fastened to a circular head 1¾ inches in diameter. No. 60 lies perfectly flat; the head being a flat piece of metal ¾-inch wide, 2½ inches long; it is so made as to fold over, when extended, and form a broad triangular-shaped head.

The No. 75 is constructed with a loose tripod screw, with a long shank, making it very easy to turn the camera in any desired direction, and then clamp firmly. The top is covered with green felt, to prevent marring the camera.

No.	Sections	Length Extended Inches	Length Closed Inches	Weight Ounces	Price
51	3	39½	15	13½	$2.75
52	3	45	16½	14⅓	3.00
53	4	48½	14	19	3.60
60	5	50	12	21	5.00
75	4	50½	15	25	5.00

GEORGE MURPHY, Inc., Retail Department

57 East Ninth Street **NEW YORK**

A STUDY OF MISS J. Wm. Shewell Ellis.

The American Annual of Photography 1918

VOLUME XXXII

Edited by Percy Y. Howe

NEW YORK
THE AMERICAN ANNUAL OF PHOTOGRAPHY, INC.
MCMXVII

Federal Printing Co., New York

PREFACE

DESPITE the unusual conditions prevailing at this time, we have been able to maintain the same size Annual as formerly. On account of the scarcity of paper stock we are "doing our bit" by omitting from this issue our usual frontispiece so as to conserve the material for photographic purposes.

The present volume is almost entirely the work of American photographers, as the restrictions placed on the mail by our Allies have prevented us from receiving our usual European contributions.

We wish to extend our sincere thanks to all who have in any way helped in the making of this volume.

Contributions for our next volume should reach us before August 10th, 1918, and should be forwarded to the address given below.

PERCY Y. HOWE, Editor.

422 Park Hill Avenue, Yonkers, N. Y.

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"If I could put my words in song,
And tell what's there enjoyed,
All men would to my gardens throng,
And leave the cities void."—Emerson.

The American Annual of Photography · · 1918

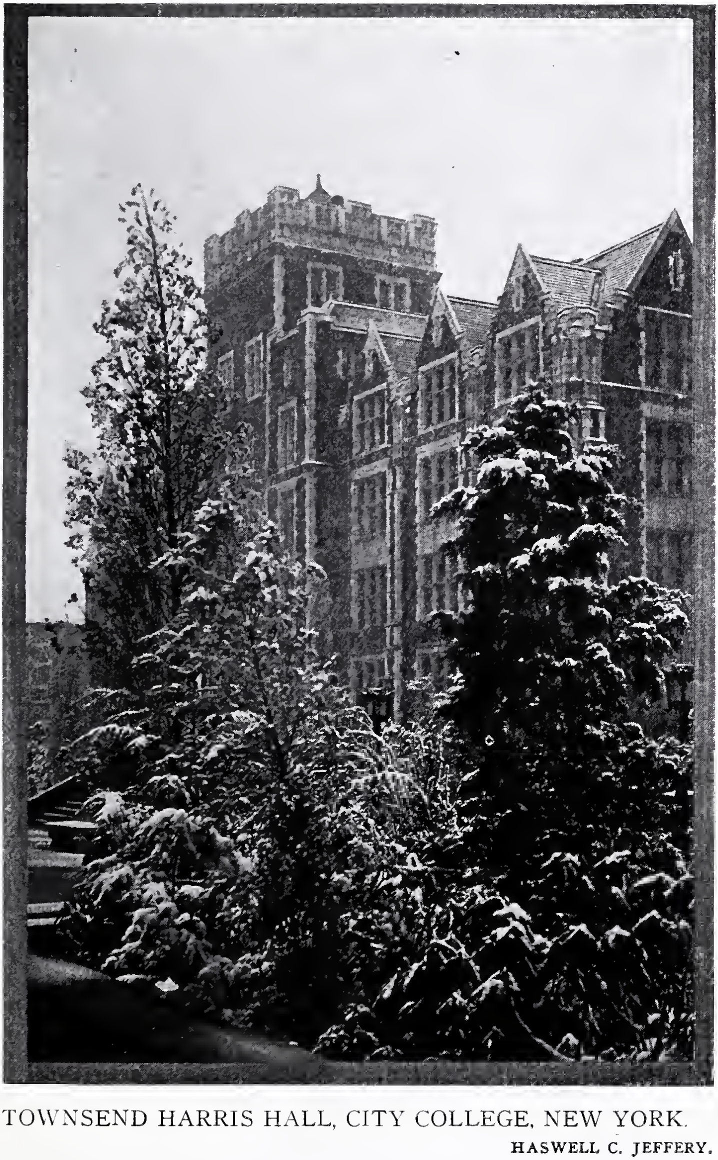
LENSES WITH REGARD TO HAND-CAMERA USE

By A. H. BEARDSLEY

THE usually accepted definition of a "hand-camera" is that it is a camera "sufficiently light and portable to be used in the hand instead of on a tripod." Modern mechanical ingenuity has made possible a hand-camera equipped to use a plate or a film as large as 5 x 7. The same ingenuity has evolved a camera made to use plates or films as small as 4½ x 6 cm. or 1¼ x 1¾ inches and compact enough to slip easily into the average vest-pocket or purse. This is the gamut of the present-day hand-camera. The small sizes are known as vest-pocket or miniature cameras and the larger ones as coat-pocket or pocket-cameras. Those that are too large for the pocket are known as hand-cameras; though, of course, all are really hand-cameras and may be used without a tripod. From year to year the number of vest-pocket, coat-pocket and hand-cameras has increased to such an extent that the would-be purchaser is amazed and likewise confused by the array. Not only the variety and the clever construction of these cameras is marvelous, but the fitting of all manner of lenses to them is done skillfully and efficiently. It is now possible to obtain as complete a selection of lens and shutter-equipments on a vest-pocket camera as could be obtained formerly only on cameras designed for serious professional photography.

The question of lenses becomes a different and, perhaps, more important factor in hand-camera photography than it does with regard to making pictures with a view-camera on a tripod. Most vest-pocket and hand-camera pictures are made with a view to subsequent enlargement. This fact necessitates microscopic definition, covering-power and illumination. Another point is that most of the focusing is done by scale and not by ground-glass—excepting, of course, reflecting-cameras. With the vest-pocket or miniature type of hand-camera, depth of focus is obtained at lens-apertures impossible to use on the larger equipments. True, the basic laws of optics still hold good; but their application must be modified to apply to each type of hand-camera. For example, F/4.5 on a 1⅝ x 2½ vest-pocket camera will give as much light-speed as it will on a 3¼ x 5½ hand-camera; but the depth of focus is very far from being the same. Again, a shutter-speed of 1/100 of a second might be identical on both cameras; but the relative amount of motion that each would stop differs amazingly. It should be clear from the hints already given that the question of lenses and their use on hand-cameras demands the virtual dismissal of all preconceived ideas based on previous experience with large cameras.

In all probability no hand-camera will ever supplant in popularity the well-known box-form type among beginners and those camerists who wish to avoid focusing. Excellent meniscus and meniscus-achromatic lenses are fitted to these cameras by all manufacturers. The speed of these lenses varies from F/11 to F/16 and they are particularly designed to cover sharply the size plate or film for which the camera is made. Fixed-focus hand-cameras are now made in 1¼ x 1¾, 2¼ x 3¼, 2⅞ x 4⅞, 3¼ x 4¼ and 3¼ x 5½ sizes. Some old models may be found to take 4 x 5 plate or film. The rotary form of shutter usually supplied gives a speed of about 1/25 of a second. This speed and stop F/11 or F/16 on a clear day will give ample exposure for most amateur requirements. Bulb and Time exposures may be made also, and a variation of three stops enables the intelligent camerist to do admirable work without giving a thought to focusing. As a matter of fact, most box-form hand-cameras are in focus from about nine feet to infinity. For the person who wishes to avoid every possible complication and who wishes to enjoy picture-making with the least possible mental and physical effort there is nothing to surpass the box-form type of hand-camera.



TOWNSEND HARRIS HALL, CITY COLLEGE, NEW YORK.
HASWELL C. JEFFERY.

For those who must consider the price and yet who desire a camera equipped with a rapid-rectilinear lens there are many hand-cameras in all sizes from which to select. The use of a rapid-rectilinear lens to advantage necessitates focusing and, therefore, these cameras require more thought to manipulate successfully than the box-form type already mentioned. However, these simple focusing-models are the best possible preparation for those camerists who hope to own a more expensive outfit later. It stands to reason that the training in careful focusing obtained with one of these models will be of great value in the use of an anastigmat lens-equipment. Most rapid-rectilinear lenses work at about F/8 and are fitted to various types of simple shutters which give usually some or all of the following speeds: one second, ½, 1/5, 1/10, 1/25, 1/50 and 1/100 of a second.

The next step in advance is to obtain a camera of more substantial construction and better finish equipped with a choice of rapid rectilinear, F/7.7 or F/7.5, and F/6.8, F/6.3 or F/4.5 anastigmat lenses. The cameras now under consideration are those that are fitted with various attachments such as rising- and sliding front, brilliant finders, improved focusing-devices, rack and pinion, double and triple extension, wide-angle bed, swing-back, and other conveniences. Of course, no one camera has every desirable feature, but I am now referring to a type and not to individual models. In this same class should be included the many vest-pocket or miniature cameras and their attractive array of lenses. However, I am not including the so-called "special" models nor the reflecting-cameras which are supplied with the more expensive anastigmat lenses. In short, the type of camera now under consideration is the one that the average person might buy who can afford a good outfit but who could not buy a "special." With regard to a detailed description of each model let me refer the reader to the excellent catalogs issued by the manufacturers who will mail a copy gladly on request. The subject of lenses in connection with these cameras is a matter not always explained as fully as most camerists desire. Let us take each lens and consider it in the light of its cost and what it will do for the money.

A casual reference to the latest camera-catalogs shows that most medium-priced outfits are supplied regularly with rapid

NATURE MAN OF PALM SPRINGS.

LOUIS FLECKENSTEIN.

rectilinear lenses at one price, with F/7.7 and F/7.5 at another and with F/6.8 and F/6.3 and F/4.5 at still another price. The question that interests the intending purchaser is what each lens will do and whether it is worth the money to buy the outfit equipped with a slow or fast anastigmat lens.

First, let us see what the rapid rectilinear lens offers. Its maximum speed is about F/8 which is ample for nearly all kinds of photography under favorable weather conditions. By stopping down and lengthening the exposure, negatives of remarkable depth and sharpness may be obtained. It does not require an expensive high-speed shutter to be used with it and a maximum speed of 1/100 of a second is sufficient for most requirements. When a rapid-rectilinear lens is of a symmetrical or convertible construction and there is sufficient bellows extension its single combinations, stopped down, may be used successfully to obtain an enlarged image of distant subjects. With regard to drawbacks, the rapid-rectilinear lens is comparatively slow; its definition wide open does not always extend to the edges of the plate or film and for this reason a rising-and-sliding front is of little practical value; it does not permit picture-making under unfavorable conditions and only slow-speed shutters may be used with it. There are other facts pro and con; but the above should serve to help the purchaser reach a decision.

The medium-priced F/7.7 and F/7.5 anastigmat lenses, so much in the public eye at present, are a trifle faster than the rapid-rectilinear lenses; they cover the plate or film *sharply* to the edges at full aperture and they do not require the use of a high-speed shutter. Briefly, these lenses are virtually as efficient on the cameras to which they are fitted regularly as the higher-priced anastigmats. However, remove them from the camera for which they are particularly intended and their work is inferior to that of the more expensive lenses. The pronounced advantage of the medium-priced anastigmat over the rapid-rectilinear lens is that of *covering-power* at full aperture over the plate or film for which it is listed. There is not an appreciable gain in speed for picture making under unfavorable conditions.

The main drawback to the F/7.7 and F/7.5 medium-priced anastigmats is their lack of efficiency on any other camera

MOONLIGHT. F. C. BAKER.

except the one to which they are fitted. Of course, if identical conditions of focus, size of plate or film and fitting can be duplicated in another type of camera these lenses may be used satisfactorily; but this is not always possible. It would be like trying to make a one-inch do the work of a two-inch pipe. Both are excellent, each in its sphere of usefulness; but they are not necessarily interchangeable. Most medium-priced F/7.7 and F/7.5 anastigmat lenses are not designed to permit the use of either front or back combinations alone. However, since comparatively few of these lenses are fitted to double or triple extension cameras this is not a serious drawback. Any lens may be so fitted as to produce results not credited to it in lens-catalogs; but here we are not considering what *might* be done, only that which is claimed for regular factory-fitted lenses and cameras. Next to the purchase of a "special" or reflecting-camera fitted with high-grade and expensive anastigmat lens, the would-be purchaser can do no better than to select one of the many excellent medium-priced anastigmat lenses now supplied regularly on many cameras.

At length, we come to the high-grade anastigmat lenses with regard to hand-cameras. Nearly every thinking, practical camerist plans to own a high-grade equipment sooner or later. To him such an outfit represents the goal of his photographic ambitions. He buys, exchanges, and buys again—always with the hope of improving his equipment until he gets *just* what he *thinks* he wants. Then he discovers that there are still many uncaught fish in the sea of cameras and lenses. However, once embarked on his pilgrimage among high-grade equipments, the camerist rarely returns to the less expensive outfits and so he continues to wander on patiently seeking his ideal. With the desire to reduce needless effort and searching, I will try to point out some facts about high-grade cameras and lenses.

Let us consider first the matter of size and construction. It should be clear by now that a hand-camera may belong to one of three types, viz., vest-pocket, coat-pocket and 5 x 7 hand-cameras. In each there are *de luxe* models equipped with the finest anastigmat lenses and high-speed shutters. The purchaser must decide first what size of hand-camera will meet his requirements to the best advantage. As a rule, the matter

MISS ST. P. JAMES N. DOOLITTLE.

of size is the least troublesome factor to decide. A camera is light or heavy, small or large and uses plates or films. The selection of the size depends on *your* physical strength, on your photographic requirements and on *your* personal whims—that is all there is to it. Any one of these factors may decide the question of size to the exclusion of the other two. There is no definite method of procedure and there cannot be one. In the last analysis, every camerist has his own ideas about size and he buys accordingly.

With regard to construction most practical camerists now agree that it is advisable to favor the simpler forms of camera-construction. There are several cameras on the market today whose construction is as wonderful and delicate as that of a watch. However, the opening-and-closing mechanism and the manipulation of some of these cameras requires too much attention to detail to suit most purchasers. In short, these delicate beautiful instruments are a delight to show to admiring friends; but are apt to be poor equipment for the *average* camerist to carry on his travels away from home—and the repair-shop. It is all very well for the man who can afford several cameras to purchase one of these dainty equipments, for he is not dependent on it and he enjoys playing with it at no risk to his photographic success. Therefore, let the "one-camera" man heed my advice and let him select an equipment that is well built, thoroughly practical and simple in its mechanical features. Lest I be misunderstood, let me state that my suggestion is directed to the *average* camerist. It is a well-known fact that there are many who know how and who like to handle delicate apparatus and that such camerists have little trouble with the daintiest equipment.

We now come to the matter of anastigmat lenses and high-speed shutters fitted to all three types of hand-cameras under consideration. The equipments to be considered comprise the *de luxe* or "special" models and reflecting-cameras. We will assume that the matter of size and construction has been decided and that the important question of lens and shutter remains undecided.

The vest-pocket type of hand-cameras are now issued regularly with F/6.8, F/6.3, F/4.8 and F/4.5 high-grade anastigmat lenses mounted usually in high-speed between-the-lens shutters

SUNLIGHT THROUGH THE POPLARS.

ELIZABETH WOTKYNS.

giving speeds of one second, ½, 1/5, 1/10, 1/25, 1/50, 1/100, 1/200 and 1/300. Some vest-pocket models are equipped with focal-plane shutters giving a great variety of speeds, including 1/1000 of a second. However, in most cases the between-the-lens shutters are preferred to the focal-plane as regards vest-pocket equipments. The lenses for miniature cameras, as issued today, are marvels of the optician's skill. To their crisp definition, brilliancy and covering-power must be added their remarkable depth of focus at full aperture; due, of course, to their short focus. With regard to speed, it may be said that, optically, the same relation between F/6.3 and F/4.5 exists in the smaller as are found in the larger lenses. However, since the pictures are so much smaller and the eye unassisted cannot see the difference in depth of focus, it may be said that for the average camerist one speed of lens is as good as another with regard to depth. The main distinction lies in the matter of volume of light admitted during a given exposure. For speed-pictures at maximum shutter-speed, F/4.8 and F/4.5 are unquestionably superior. Likewise is this true of exposures under unfavorable conditions. Over-exposure must be guarded against and the largest opening used only when absolutely necessary. Lenses of F/6.8 and F/6.3 can make speed-pictures and they are also excellent in cloudy weather; but it stands to reason that in a pinch, the faster lenses are more likely to produce results. At the same time F/6.8 and F/6.3 lenses will be found to be eminently suited to nearly every ordinary requirement and, with the exception of light efficiency, fully as satisfactory. For myself, I should select an F/6.8 equipment because for my requirements it is fast enough in view of the fact that I make few speed-pictures, studies in the middle of a rain-storm, or landscapes very late in the day. The entire matter really amounts to the fact that all the anastigmats supplied on miniature cameras today are most efficient, but that the F/4.8 and F/4.5 lenses offer the purchaser reserve power if he should need it.

With regard to the pocket and so-called hand-cameras, the question of lenses requires even greater attention. The governing factors are the size of the picture, the construction of the camera and the work in hand. For general amateur requirements with 2½ x 4¼, 3¼ x 4¼ and 3¼ x 5½ cameras

PORTRAIT OF MISS FOX. CLARENCE H. WHITE.

the F/6.8 and F/6.3 lenses are preferable to faster lenses because the slower lenses are more easily handled and are fast enough to take care of all ordinary speed and cloudy-weather exposures. This is true likewise with regard to the same size cameras equipped with long bellows-extension to do scientific work. Focal-plane reflecting-cameras in these sizes may be used successfully with F/6.8 and F/6.3 lenses; but I should advise F/5.5 or F/4.5 lenses as better adapted to this type of camera. Some "special" models equipped with high-speed between-the-lens shutters also use the faster lenses to better advantage. It seems to be the tendency of the owner of a camera fitted with a high-speed shutter to use the maximum speeds whenever it is possible to do so. Hence my advice to use a fast lens. Remember, I am referring to the *average camerists.* Advanced amateurs and professional photographers use the maximum shutter and lens-speeds as rarely as possible and then only to attain a specific result to be had in no other way.

. With regard to 4 x 5 and 5 x 7 hand-cameras the slower lenses are to be preferred for general photography and serious scientific research. Reflecting-cameras in these sizes are best fitted with fast lenses and also "special" models intended for press-photography and home-portraiture. On plate-cameras used for serious work a high grade F/6.8 or F/6.3 convertible lens is the most satisfactory one to buy. For speed-pictures and technical press-photography the fast lenses are a virtual necessity.

Of course, there are countless camerists both amateur and professional, who can show all manner of remarkable pictures to prove what a slow lens will do with regard to speed-pictures and what a fast lens will do with regard to depth of focus and covering-power. It was not and is not my intention to start a discussion. From experience, I know that all those concerned hold to their own opinions as strongly *after* as they do *before* such a discussion. The result is that all of us act as we see fit and assume an air of condescension toward those with whom we differ. If loyalty is a commendable virtue, camerists should be praised, for they show it unwaveringly toward their lenses at all times and in all places.

It would require unlimited space to go into further detail with regard to this interesting subject. At best, I have touched but lightly on the efficiency of the many excellent lens, shutter and camera-equipments now on the market. My opinion, based on experience, is that for *most* amateur requirements the slow is to be preferred to the fast lens; but for speed and press-photography the fast lens is essential. However, in the vest-pocket and coat-pocket size cameras both slow and fast lenses are most efficient. Always buy the best equipment that the purse will permit; but never forget that it is *you,* not the equipment, that must assume the responsibility for subsequent failure or success.

A STUDY IN FLAT LIGHTING. K. TAUSIG.

DIRECT POSITIVES

By SAMUEL WEIN

THE production of positives instead of the usual negative has been the subject of considerable investigation by photographers and chemists.

Various processes and formulas have been published from time to time, but that formula making use of any of the thiourea salts has not been used to any extent by the investigators, although it is the most successful of all.

Col. J. Waterhouse (1890) while investigating for a suitable preservative for "eikonogen" discovered that thiourea (or its compounds) added in very minute quantities to the developing solution possessed the remarkable property of more or less completely transforming the negative into a positive and was able to produce at will perfect positives in place of the usual negatives, under otherwise quite normal conditions of exposures in the camera and of development.

There are quite a few thiourea salts known to chemists; herewith the writer gives those that have been tried and found to give the best results:—

Allyl-thiourea; Allyl-thiocarbamide; Thiosinamine

$$C_4H_8N_2S \text{ or } (SCNH_2)NHC_3H_5$$

Phenyl-thiocarbamide; Phenyl-thiourea; Phenyl-sulphocarbamide

$$C_7H_8NS \text{ or } CSNH_2(C_6H_5)$$

Thiocarbamide; Sulphurea; Thiourea

$$CH_4N_2H \text{ or } CS(NH_2)_2$$

All of these are made according to Reynold's (Jour. Chem. Soc., Vol. 59, page 383; 1891) by the action of ammonia on volatile oil of mustard, according to the equation:—

Oil of Mustard		Ammonia		Thiosinamine
	+		=	
$SCNC_3H_5$		NH_3		$C_4H_8N_2S$

Practically it is made by bruising and macerating black seeds of mustard for 12 hours in 5 parts of water. Distill till no more oil passes. Separate the oil, and use the aqueous

Belle Johnson.

distillate, which contains some oil in solution, for maceration of fresh seeds.

The crude oil is dehydrated by calcium chloride and re-distilled till colorless. It boils at 145 to 150 deg. The distillation should be effected in a draught cupboard or other means be taken to avoid contact with the vapor of the oil, which has a very unpleasant effect upon the nose and eyes.

Saturate the oil with ammonia vapor, or mix it with 3 to 4 times its volume of strong aqueous ammonia. Set aside until it crystallizes, and filter. The mother liquor should be boiled to expel the ammonia and evaporate.

It consists of colorless or slightly yellow rhombric crystals, melting at 70 deg. C., and having a strong odor of garlic.

The developer used by Col. Waterhouse is:

"A"

Eikonogen	5 Parts
Sodium sulphite	10 Parts
Water	100 Parts

"B"

Sodium carbonate	8 Parts
Water	100 Parts

Take equal parts of A and B to two parts of water, and adding from 20 to 25 parts of a saturated solution of thiosinamine to the 100 parts of the mixed developer.

The addition of a small quantity of potassium bromide (1 to 5 parts of a 10% solution to about 100 parts of the developer) aids the reversal to a great extent.

Develop as usual, keeping the temperature between 60 and 65 deg. F.; the negative soon appears, the surface of the film or plate seems to fog, and soon the positive image can be seen by transmitted light. Care must be taken not to over-develop, as the positive image is too strong. This indicates over-exposure, and may be reduced slightly by Farmer's reducer. A foggy positive with practically no negative indicates under-exposure, provided that the temperature of the developer has been kept within the proper limits. Development is rapid, being usually complete within four minutes. The positive image is characterized by its color; with the above conditions it will be red, warm sepia, or purplish-red. The negative image is black and very transparent.

Recently Perley has had better results with a hydroquinone developer than that suggested by Col. Waterhouse. It is here given as used:—

"A"

Water	100 Gm.
Sodium sulphite	12.6 Gm.
Hydroquinone	2.1 Gm.

"B"

Water	100 Gm.
Sodium carbonate	28.2 Gm.

For use mix 1 part of A to 1 part of B, add 2 parts of a solution of thiosinamine (1 to 1000 parts of water), adding 0.5 c.c. of a 10% solution of potassium bromide to the 100 c.c. of developer.

During the course of many experiments it has been found that different developers have different effects. Satisfactory positives were obtained with an "adurol" developer containing a rather large amount of alkali, but "amidol" was unsatisfactory. "Metol" produced very peculiar results. A small amount of it added to the hydroquinone developer increases the density of the negative image, but acts as a restrainer for the positive image.

It is interesting to note that the more alkaline the developer the stronger the positives and the weaker the negative image obtained. The effect of the thiourea compounds seem to be alkaline. With adurol the amount of sodium carbonate required was four times the amount that recommended by the manufacturers of the plates or films.

Another interesting fact is that the relative large amounts of potassium bromide are required to produce any restraining effect on the developer. It requires cubic centimeters where one would use drops in the ordinary development, the only effect apparent being increased time required for development. If thiourea is used the addition of some bromide is advantageous. Acetone sulphite acts as a restainer, but seems to hold back the "half-tones" more than the shadows, tending to give harsh results. Potassium iodide is a more powerful restainer than the bromide; the latter being easier to control and was generally used in many of the writer's experiments when a restainer was necessary.

A CRYSTALLINE MORNING. DR. FRANK F. SORNBERGER.

MULTIPLE GUM

By DR. RUPERT S. LOVEJOY

TO the appeal of the imagination and poetic sense of the truly pictorially inclined, no process seems to offer such varied possibilities as multiple gum printing. The control of tone values of either high lights or shadows independent of the other; the ability to render detail or breadth; and choice of color are some of the charms open to the serious worker of ideals. This paper is not intended as a complete treatise on gum, but to touch on a few things that may be of interest to some workers in the rudimentary stages of this process.

In choice of paper to be coated, one should be guided by the desired effect of the finished picture, whether desirous of broad masses, or more or less detail. The smoother surfaces are better adapted for detail, while the rougher surfaces are more suited for sketchy and broad effects. Whatman papers are very good, especially some of the thick, rough surfaces, but, unfortunately, these papers are expensive at the present time, on account of war conditions. There are a number of good water-color papers that can be used. I have lately been using with success a charcoal paper bearing the water-mark "M. B. M. (France)" which has a very satisfactory texture and is inexpensive.

Those who have not used paper negatives should give them serious consideration. To my mind they are especially adapted to gum printing. A good, thin bromide paper of even texture should be selected. Of the brands easiest to obtain at the present time are P. M. C. No. 1 and Monox No. 2. The P. M. C. No. 1 seems to have greater latitude of exposure and development, while the Monox requires more exactness, but I have had some excellent results with the latter. A well timed and softly developed negative will undoubtedly give the best results. The transparency used to produce the enlarged paper negative should also be fully exposed, and softly de-

PINE TREE BY THE SEA.

Illustrating article "Multiple Gum," by Dr. Rupert S. Lovejoy.

veloped. To get the best effects in gum, one ought to use as large as a 11 x 14 size.

The chief charm in a paper negative is the ease with which one is able to work with a pencil. Highlights can be accented at will, faults and defects can be corrected; and even accessories worked in judiciously, either on front or back of the paper. For example: a night scene with a crescent or full moon worked in, or perhaps the contour or height of a tree may not be right to make good composition. With pencil and sharp knife this may be corrected. In some cases there may be a too insistent high light. This can be lowered by either a very sharp knife, or a coarse eraser.

These modifications are best done by placing the negative over ground-glass with illumination from the other side, so to better see the gradations. There is no end of work that may be performed on a paper negative by the careful worker. These advantages coupled with the possibilities of control in the gum print itself gives the pictorialist wonderful opportunities. One thing not to be despised is its low cost compared to the glass plates, and convenience of storage.

Our next consideration is the sizing of the paper before the gum-coating. Two methods have proven satisfactory in my work. First, take one part of your regular gum solution, to this add about four parts water, then add just enough of your bichromate solution to color it; mix well, and then with your brush, coat the paper evenly. When dry expose to the sunlight for a short time. This renders the gum insoluble, and the paper is now ready for the pigment coating.

The other method which I generally prefer, especially when I want good clear highlights, is to use the gelatine formula recommended by Demachy for coating paper for the Oil process, viz.:

6 gr. Thymol dissolved in 30 to 60 min. alcohol.
Add this to 20 oz. water (cold).
To this add 1 oz. of gelatine (Nelson's).
Let stand an hour.
Then heat in water bath to 120 degrees, and filter through muslin. When cool, to use, this should be heated to not over 120 degrees, and to every ounce it is well to add 6 to 8 drops of saturated solution

GOLDEN AUTUMN.

Illustrating article "Multiple Gum," by Dr. Rupert S. Lovejoy.

of chrome alum before coating. This may be coated over the paper evenly with a brush and hung up to dry. (If allowed to dry on a flat surface, will stick on edges.)

This is a simple method and a very good one. Several sheets of paper may be sized by either of these two methods in a very short time.

The following are the solutions I use in my work:

Gum Solution:—

Gum Arabic (tears)	3 oz.
Water (cold)	4 oz.
Formaldehyde	5 min.

The gum arabic in a small muslin bag is suspended in the water for about 2 days, or until all dissolved.

Sensitizing Solution:—

Water	10 oz.
Ammonium Bichromate	1½ oz.
Manganese Sulphate	200 gr.

I much prefer this to the plain ammonium or potassium bichromate solutions. It seems to give when developing in the water a firmer and more tenacious surface to work upon.

A good average proportion for the coating mixture I find is:—

Gum Solution	1 drachm
Bichromate Solution	2 "
Plus Pigment.	

This amount is sufficient to coat one 11 x 14 sheet of paper.

Personally I believe in using a thin coating mixture, or, in other words, not too heavily loaded with pigment. One has better control of the highlights; and the building up of the shadows at each printing is better watched. The thin printing may mean more coatings and printings, but the finished result is well worth the extra amount of work. The first two or three printings should be thin as regards the pigment, then after caring for the high lights and half-tones, the gum mixture may be richer in pigment till the proper depth in the shadows is attained.

For example of control in gum, we will assume that a print is to be made from a negative with rather dense high lights, viz.: Clouds which we wish to preserve. We know with a coating mixture fairly rich in pigment to print in the sun long

THE LIBRARY. G. W. Harting.

enough to get through the high lights, that the shadows and half-tones will be so utterly over-exposed that it is impossible to wash off but little, if any, of the pigment. It is obvious that if a thin pigment printing is made with full exposure to get down into the high lights, we will get tone in our high lights, and it does not matter so much if the shadows do not get washed out, as the tone will not be so dark, but that the successive printings of increased richness of pigment will take care of shadows and half-tones very well.

A few general rules are as follows:—

To obtain a print in low key, print very full, slightly over-expose. The same is true if you wish to deal with masses and cut down detail. For accents use a brush (soft, or bristle, as the occasion demands) and a fine pencil stream of water. To get contrast, after the high lights are cared for, the printing time is shortened, so that the high lights wash off easily, thereby leaving the pigment in the shadows. For getting detail, a good plan is to slightly over-expose in printing, and give longer time soaking in the water. You can then work on the print more, and alter tones with less liability of washing off the pigment.

A great deal can be written about what to do, and how to do it, but experience is necessary to develop the gum artist. I know of no process where individuality may be shown any more than in gum work, for two persons can use the same method, pigments, negatives, etc., and the results be entirely different. Multiple gum in the hands of the true pictorialist will respond to his feeling of poetry, and to the imagination, as well as to work of great strength and vigor. It is a process for one who wishes to make a work worth while.

LINGERING RAYS. GORDON FORSYTH.

PICTURESQUE NEW ORLEANS

By GEORGE STEELE SEYMOUR

IN spite of the fact that "The Personality of American Cities" has already appeared in book form, a recent writer is credited with the statement that there are only four American cities that have any personality, namely, Boston, San Francisco, San Antonio and New Orleans. Whatever question there may be about the right of other places to bear the distinction, it is certain that New Orleans, the "Old French Lady," is in a class entirely by herself.

She is in turn a bit of old France transplanted to the new world, a historical museum, a great shipping port, a tropical garden and a memento of the South in arms, according to the way you look at her. To regard New Orleans entirely as a French Quarter is a great mistake. It is true that the "Vieux Carré" is a never failing source of interest to the tourist and presents an ever changing panorama to his interested gaze, but to confine one's sightseeing entirely to that feature is to

PICTURESQUE NEW ORLEANS: THE COURT OF PALMS.

GEORGE STEELE SEYMOUR.

miss nine-tenths of the interest in this delightful old city. For that reason our illustrations have been chosen to show other aspects of her life.

The picture, "Boats on the Canal Basin," stands at once for the French Quarter and the shipping industry. It must have been her old-world forefathers who devised such a foreign thing as bringing a canal into the heart of the city, and naturally they led it to the quarter where they themselves were most at home. Past grimy houses and woodpiles and rubbish heaps it flows, and when the houses and rubbish become too thick for further progress, it simply stops. You will find the Canal Basin in George W. Cable's stories, for he also appreciated its artistic value.

If you are a tourist in search of the Old Absinthe House, or the Napoleon House, or the French Market, or the Archbishopric, or the Cabildo, you may overlook it, but if you are a queer little man with an unkempt beard and live in an apartment over an odd, grubby courtyard off the Rue Royale and go to say your prayers before the statue of Saint Anthony of Padua, you will not overlook it, because it will be a part of your daily life. The Basin, like the Quarter it inhabits, is a relic of the past, but if we are to believe its own evidence, when aerial expresses are whirling passengers from New York to Chicago in five hours, its lazy sloops will still be bringing diminutive cargoes of cord-wood into the heart of the French Quarter from the opposite shore of Lake Pontchartrain.

Nature has been lavish in decking the Crescent City with all sorts of tropical verdure. Left to herself, she supplies mangrove thickets and cypress jungles, draping the larger growths with Spanish Moss that hangs from the branches of the trees like ghostly festoons. I know of nothing more grewsomely attractive than a grove of cypresses decked in Spanish Moss, whose gray color makes it seem like a phantom forest pointing with long, dead fingers.

But the parks have been stocked with all sorts of beautiful trees and plants that grow in profusion in a hot climate, and City Park is especially rich in such decorations. It is here that the Court of Palms is to be found. One may drive for a long distance between rows of palms that completely shut out

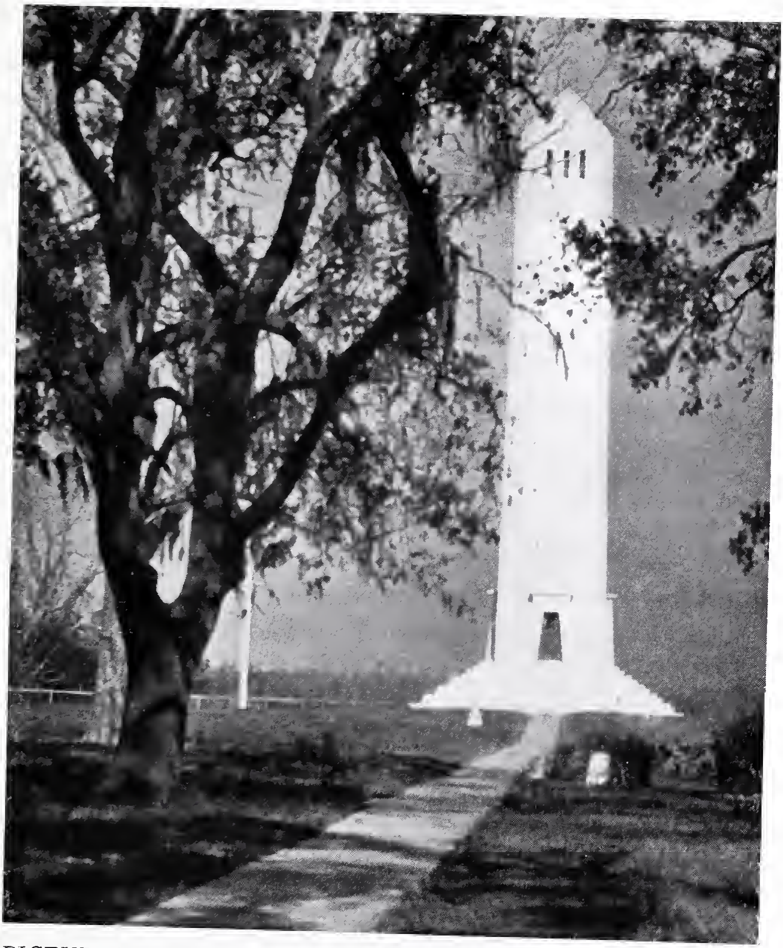
PICTURESQUE NEW ORLEANS: THE CANAL BASIN.

GEORGE STEELE SEYMOUR.

the view. Even more glorious are the oaks, which attain heroic stature and bend themselves into wonderful shapes, in honor, we will suppose, of their connection with the genteel practice of duelling which once flourished under their branches but which modernity has at length succeeded in stamping out, along with many other genteel things.

Let our last view of New Orleans be as a shrine of history, which, indeed, must embrace the entire city. Broad Canal Street, with its four car tracks and forbidding Custom House where Ben Butler made his headquarters, is an incident of the Civil War, while the old Spanish Fort on Lake Pontchartrain, where a cannon bearing the royal arms still holds the fortress for its garrison of chameleons, and its governor of three centuries ago has found his last resting place so many long miles away from his beloved Castile, stands as a page out of Prescott visualized to our wondering gaze.

When we have finished training our kodak on the crumbling bastians, let us look out across the broad Lake and fancy that we see the flotilla that sailed in here one day about a hundred years ago bearing the famous General from Tennessee known as "Old Hickory," come to defend the city from the attack of the British invaders. Then let us travel along a good shell road that follows the course of the Mississippi towards the sea to the spot where he did his work so well and thoroughly. Chalmette is its local name, and his proud fellow citizens have erected a white shaft, not unlike the one at Bunker Hill, to commemorate the victory of Andrew Jackson and his regiments of sturdy backwoodsmen over the trained forces of Britain—many of them veterans of Waterloo—on January 8th, 1815, two weeks after a treaty of peace had been signed terminating the war. As well as being one of the most glorious feats of American arms, it was our last conflict with Great Britain, and at this spot, about the time when our picture was taken, was celebrated the conclusion of one hundred years of peace between the English-speaking peoples. Henceforth may it be a peace monument.



PICTURESQUE NEW ORLEANS: JACKSON'S BATTLEFIELD.

GEORGE STEELE SEYMOUR.

AN ELECTRIC METHOD FOR MAKING PICTURES

By DR. BRAXTON D. AVIS

SOME years ago I discovered a simple method for producing pictures on a metal plate, or other analogous member, by the use of an electric current, and when certain precautions are observed pictures in brilliant colors can be produced at will and in a few moments.

Believing this may be of some interest to the readers of the *Annual*, I am contributing this article for their consideration.

I found that a film of bichromated gelatine after a short exposure to light was capable of varying the ohmic resistance of an electric current passing through same, and that the longer the light acted the greater the resistance to the current. This no doubt is due to the well-known fact that bichromated gelatine after exposure to light will not swell up or dissolve in warm water; consequently where the light has acted the strongest, the gelatine becomes at this point more dense and offers more resistance to the current. This phenomena can be utilized for making pictures, and I will now describe a simple method of obtaining them.

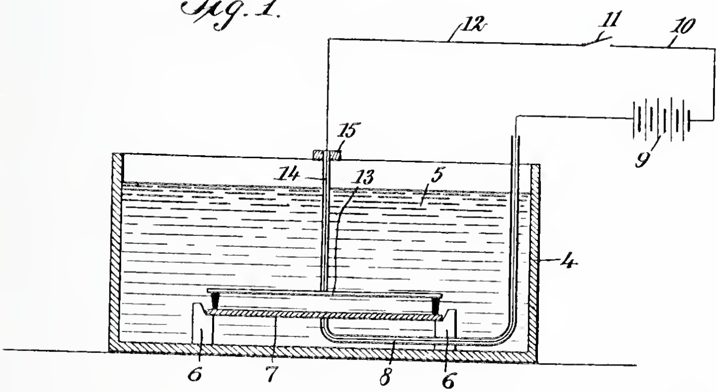
A nickel plated copper plate well polished and cleaned is coated with a solution of gelatine—containing a bichromate—in a place sheltered from strong light and dried. This coating after drying should be about as thick as the film on a common bromide plate. A ten per cent solution of gelatine containing about one-fourth of its weight of potassium bichromate answers well for all practical purposes.

After this coating is well dried the metal plate is exposed to bright light, films in contact, under a photographic negative in a printing frame. The exposure to light is about as long as for a carbon print. To obtain good results an actinometer should be employed to time the exposure, and the negative used should be one containing strong contrasts.

Rudolf Eickemeyer.

After this exposure to light the plate is removed from the printing frame and the back and edges are varnished with a thin solution of collodion, this being for the purpose of properly insulating all parts of the metal plate except the surface which is to receive the image. The plate is now put in cold running water to remove all soluble chromium salts, and while the film of gelatine is still wet the metal plate is connected to an insulated wire leading to the positive pole of an electric battery of two or three cells and immersed into a suitable electrolytic vessel containing a solution of a salt of lead.

Fig. 1.



Reference is now made to the accompanying drawing (Figure 1). An electrolytic vessel is shown at 4 and is filled with a solution 5, consisting preferably of plumbate of soda or potassium as the case may be. Mounted within the vessel 4 are supports 6 of insulating material and the plate 7 which is to receive the image is rested upon these supports. An insulated wire 8 is connected with the plate 7 and leads upwardly and outwardly to a battery 9. Connected with this battery is a wire 10 which leads to a hand switch 11 connected by wires 12 and 14 with a metallic electrode 13.

The wire 14 is insulated and is supported from a cross bar 15, so that the electrode 13 hangs in the solution directly over the center of the gelatine coated plate 7.

This electrode should be flat and somewhat smaller than the plate 7 and should hang about ¼ of an inch above it.

When everything is in place the hand switch 11 is closed and the current is turned on. The solution is electrolyzed and the face of the plate 7 undergoes various changes in color. The circuit must be broken promptly when the desired color is obtained for the reason that these colors begin to form immediately and while the current continues to flow are very changeable.

By skilful use of the electric switch and by closely observing the edges of the plate 7 the operator is enabled with a little practice to stop the formation of the picture at any period necessary to give the particular color desired.

When the picture is suitably developed which may vary from five to thirty seconds, depending on the strength of the current employed, it is removed from the electrolytic bath and washed in warm water which removes the entire gelatine film, and the image will be found electro-deposited on the surface of the metal plate.

This coloration which results from electrolyzing a solution of a salt of lead are iridescent colors and are obtainable in all varieties. The effect is due to the decomposition of white light by the exceedingly thin film of peroxide of lead deposited on the surface of the plate.

They are very beautiful and durable and the pictures made by them are somewhat of a novelty.

Solutions containing non-astringent metallic salts other than lead can be used to make pictures, but when so used the metal plate which is to receive the image should be connected to the wire running to the negative pole of the battery and instead of obtaining colored pictures, the picture will be composed of a metal the nature of which depending of course on that particular metallic salt employed.

KNAFFL & BRO.

NUDES

By SIGISMUND BLUMANN

ANYONE can make a photograph of a nude woman who can get the woman to strip and pose, but the Gods have been good to him who is able to make a picture as well. The much vaunted Human Form Divine is not always Divine. Sometimes the abdomen pouches, the breasts sag, the waist attenuates in angles, the limbs,—but why enumerate? Those who have tried know. These are the first difficulties encountered. Comes the task of posing the model. To try to make one of the average women who do this understand that for photographic purposes she must really be the picture is like trying to put an intellect into her head then and there. If she has the form she too often lacks the imagination. One finds oneself with a lay-figure to work with.

Now, why should painters succeed so well and photographers so badly? There are many reasons. The best models do not go afield. A woman with a fine form, refinement and imagination, who is willing to stand for the altogether to an artist in the studio, may well be understood in refusing to go afield to have her nakedness and identity recorded by the camera. She doesn't wish to and generally she doesn't have to. There are too few of her to supply the demand. So the poor photographer finds his subjects where and how he can get them.

If the negatives are indoor the environments must be genuine. The obvious falsity of painted backgrounds and props are accented by the figure. If the plates are exposed in the open the climate needs be mild for the poor model is also exposed. The landscape needs to be fitting and woman and scene must somehow conform to a sense of unity.

It does not conduce to a picture to simply show a naked female beside a rock or under trees. Unless some superlative quality of beauty justify what may be otherwise meaningless,

Figure 1.

VIA DOLOROSA

ANNE BRIGMAN.

Illustrating article "Nudes," by Sigismund Blumann.

there must be some other justification. The figure must be doing something: something which a nude woman in that place and at that time would be likely to do. And she must do it gracefully. I have seen women shown on paper with their ankles bathed in the wash of tide on a beautiful shore, and for all their attitude or expression conveyed the picture might be improved by giving them at one and the same time a Russian towel and a chance to cover some of the charms we have been brought up to esteem most when least in evidence.

Too often, even in the case of pure minded enthusiasts, it is accepted that the human form is divine and that divinity justifies all things. The human form as said before is not always divine. It may be made to assume lines that are beautiful, and beauty is divine. But the veal-like quality of even a well formed woman, as also the hairy surface of a muscular male are not in themselves beautiful. They may disgust.

Taking a painting that erstwhile created a sensation—"September Morn"—we find the exquisite charm of youth and beauty accented by the nudity. The pose breathes of modesty. There is no suggestion of indecency except such as the prudes supply. A young girl finding herself in cold air and water with no immediate cover for her senses of temperature and modesty would assume just such an attitude. It is innocence personified. It is a picture. On the other hand, for all the coldness of Bouguereau's treatment, his nudes are merely naked or semi-naked. An ethereal quality, a mental process is lacking.

I have elsewhere written of the technical difficulties of making photographs, in the nude, that shall be pictorial. I should like at this time to pass over the advantages which the painter has at his command. Advantages of elimination, insertion, combination, and so forth. Instead let us consider a few ways in which nudes may be made acceptable in the photographic form. The model must be right, mentally and physically and have grace and enough imagination to follow the photographer's intentions, or to suggest and supply poses which shall make pictures. The surroundings must be appropriate, and should be unfamiliar to the general public. The startle. which comes to one on seeing a nude in a spot that

Figure 2.

LOUIS GOETZ.

Illustrating article "Nudes," by Sigismund Blumann.

one knows well is likely to take mind away from an apprecia-tion of the picture.

The figure must conform in pose and in the running lines to the surroundings. Composition covers this. Either a very definite thought must be conveyed, or the impression must be so vague as to be merely emotional. And the thought or emotion must be beautiful. Advising procedure more definitely, I should say avoid making nudes, but if you must, judge the final results coldly and severely. Unless beauty shines from all over the print destroy the negative. The technical difficulties you encounter are many and severe but they are as nothing to the mental ones. The full meaning of what lies in this may come to you by studying the really fine examples reproduced herewith (Figures 1, 2 and 3) and by comparing them with some that have come to your notice elsewhere.

Figure 1 (Via Dolorosa). The conformation of lines, both as to direction and curvature, immediately impresses one with the mystery of the artist. The "Way of Sorrow," or "The Way of Pain," is exemplified in woman and tree. There is so much emotion, so much action, so much of the higher mentality here that one would as soon speak of the nudity of the tree as of the woman.

Figure 2. Mr. Goetz has the faculty of making close up nudes merge into the picture by a sort of astalytic action. A specie of French artistry by which he comes naturally. The exquisite figure, the curves of the form and of the ripples accented by the wiry straightness of the reeds will bear study.

Figure 3. The silhouetting of the figure, the conformation of its lines to the general lines of the mass of rock, the fact that the figure is looking out and away, thus leading the observer's eye away, and the pervading mood of the whole, make this picture by Dr. Percy Neymann one worthy of the high places in art.

Figure 3.

DR. PERCY NEYMANN.

Illustrating article "Nudes," by Sigismund Blumann.

SOME USES FOR THE ACTINOMETER

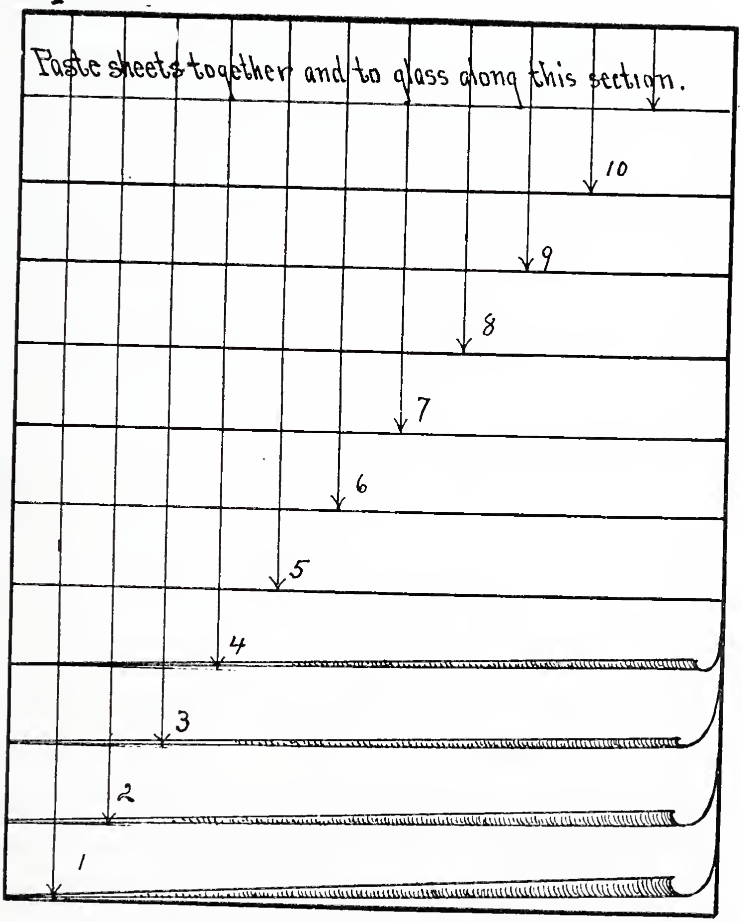
By JAMES THOMSON

AN actinometer (light measurer), a graded screen, is for the serious worker an instrument of considerable usefulness. Where one is coating one's own print paper it will be found of especial value. Before coating any great number of sheets, measures may be taken to test the gradation capacity of the sensitizer, and the supreme way to do this is through use of the graded screen. A test thus quickly made may be the saving of a lot of perhaps expensive linen paper. Workers of Kallitype, Platinotype, Plain Salted Paper and the like, have as a rule depended entirely on visual examination of the print, but it is a better, and a more scientific plan to test with the actinometer.

The actinometer—an essential too in the carbon process—is an article of commerce costing commonly $2.50, but an efficient substitute can be cheaply and easily provided through home effort. For example:

Take a discarded negative (4 x 5 or less) and clean off the gelatine coating. Lay upon a sheet of paper and draw lines around its boundary. Removing the glass for the time being, divide the space lengthwise into eleven equal divisions, and also divide at right angles with these into four equal parts (see Figure 1). Next return glass to the ruled sheet and spread upon the topmost division some adhesive. Rub into contact a sheet of tracing paper. Again as before apply adhesive and rub into contact a second sheet of paper but shorter than the prior one by one division. Continue thus until ten layers of the paper have been superimposed, each one a space shorter than preceding one. At this point the screen has a capacity to render *ten tints,* but more are needed. To effect this superimpose ten sheets pasting together at the top. Trim neatly and fasten to the glass, covering but three-

Figure 1



10 Superimposed sheets each a section shorter than that immediately preceeding it. Bind together at upper section.

Illustrating article "Some Uses for the Actinometer," by James Thomson.

quarters of the width. Now, there are *twenty tints,* but to get more we have only to continue applying another batch covering this time a half of the width. Adding in like manner another batch of ten sheets covering this time but a quarter of the width brings the available number of gradations up to forty.

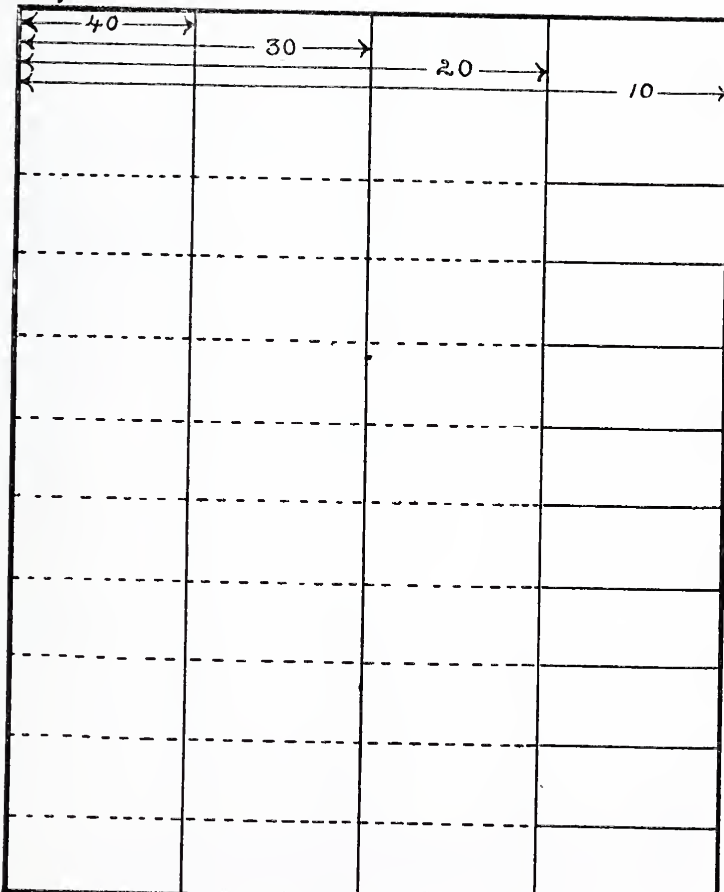
The gradations must now be numbered. Take a sheet of thin celluloid (I employed an old Kodoid film) and lay it upon the ruled paper. Beginning at the *right hand corner,* using a fine pen and India ink, inscribe the figures, the first row 1 to 10, the second 1 to 20, the third 1 to 30, the fourth 1 to 40. When the ink has thoroughly dried turn the celluloid and bind to the onion-skin sheets as well as to the glass, at the top space, with black passepartout binding.

The screen is now in present shape available, but it is advisable to make a thorough job by covering all but the numbers with black passepartout binding. There will then be forty little windows each carrying its allotted number definitely bounded by black tape.

The manner of testing in the carbon process may be described as follows: Put a strip of printing-out paper such as Solio in the frame with the negative from which the carbon picture is to be made. Place a similar strip of Solio in a 4 x 5 frame with the actinometer. Expose both at a window, and when the paper in the negative frame is just *proof deep* (both frames must be taken from the light each time of examining) make a note of the last just discernible number that has been printed upon the screen allotment of Solio. Presuming it to be 10 then mark 10 upon a corner of the negative. When in the future a print is wanted from that particular negative place a strip of Solio over the actinometer, expose to daylight, and when the printing has proceeded as far as 10 be sure that the time it took to print it can be relied upon as a basis for exposure of the carbon tissue.

A similar method can be successfully applied in daylight enlarging upon gaslight papers. Such a method was for a time employed by the writer, only being abandoned when practice made him an adept in judging required time by appearance of the negative. The plan in connection with the actinometer may be described as follows: After the correct time has been

Figure 2



Showing condition after all sheets have been pasted on.
Sheet of thin celluloid (carrying the numerals) over all.

Illustrating article "Some Uses for the Actinometer," by James Thomson.

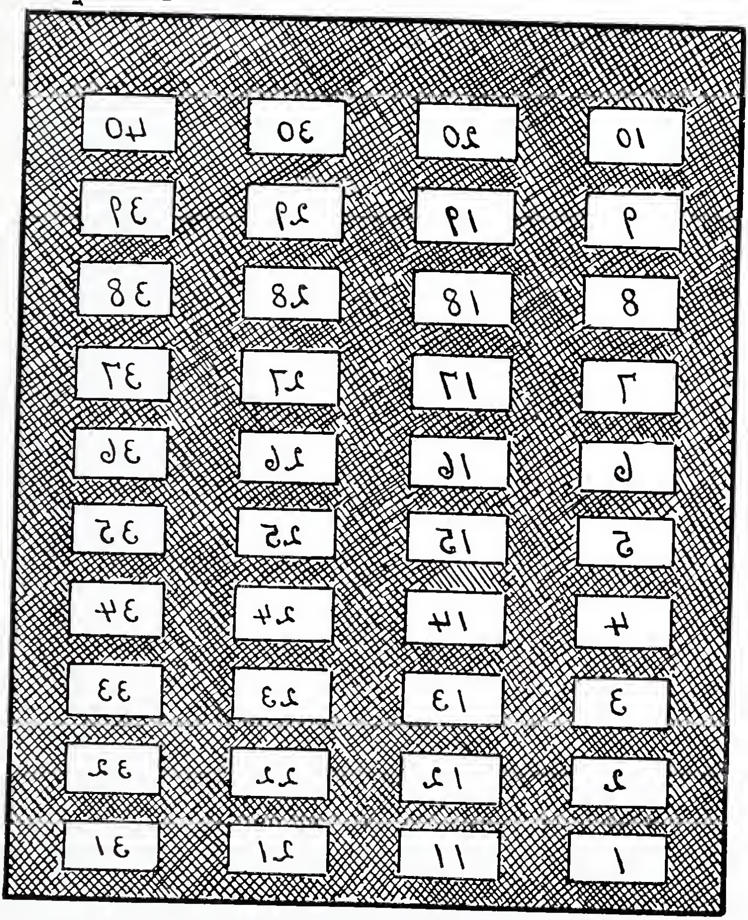
ascertained by trial and error (by exposing strips of the paper in the enlarging apparatus) place a piece of Solio in the printing frame with the actinometer and expose to the sun for 10 seconds, noting the highest number printed in that time. Expose for another 10 seconds, noting the time as before. Repeat operation thus for a full minute, noting the highest attained number at expiration of each 10 seconds. Supposing it took 40 seconds to print the gaslight strip, then take note of the number on the actinometer that took that much time to print. Then at any future time it matters not what conditions are as regards light, bright day or dull clear weather, or haze, when enlargements are required from that particular negative all one has to do is to expose under the graded screen a strip of Solio. When the number coinciding with that on the corner of the negative can with plainness be read then the time consumed in reaching it is the time to accord the enlargement. Conditions, however, must always be constant.

Plates, films, gaslight papers, platinum, Kallitype and plain silver papers may have their tonal capacity definitely determined through use of this simple instrument.

The best paper to employ for the screen is a thin tracing paper, "Onion-skin" clear and structureless. Tissue paper will not answer.

Figure 1 shows the screen as it appears in its first stage 10 sheets attached; Figure 2 shows it after all required sheets have been pasted on. In Figure 3 is shown the completed article viewed from the back.

Figure 3



The passepartout binding should be under celluloid sheet. Forty little windows each carrying its number. Numbers now reversed come to read all right in the print.

Illustrating article "Some Uses for the Actinometer," by James Thomson.

THE HESS-IVES PROCESS OF COLOR PHOTOGRAPHY

By PAUL L. ANDERSON

IT is not my intention to describe fully, in the present article, the technical methods involved in making color photography by the Hess-Ives process, for this is done in the very complete instructions issued by the Hess-Ives Corporation, and, in addition, the process has been fully discussed by Mr. Struss in his admirable article in the August, 1917, number of American Photography—Mr. Struss having approached the subject from the point of view of the advanced amateur, and having besides described certain valuable short cuts and methods of procedure not given by the manufacturers of the supplies. For these reasons I propose rather to discuss briefly the principles on which the process is founded, and to consider the value of the process to the pictorial photographer.

Before undertaking a consideration of color photography it is necessary to have a slight knowledge of the fundamental principles of light, and these are readily comprehended. Light is propagated by means of waves similar to the waves in water which result when the surface of a pool or other body of water is disturbed. That is, water waves travel forward, since the individual particles of water move up and down, each communicating its motion to the next, though there is no actual forward motion of the water particles, each particle coming to rest in its original position. Light travels in a similar manner in the luminiferous ether, an invisible, imponderable substance of zero density and infinite elasticity, which pervades all matter, these waves being set up by any self-luminous body, and being reflected from material substances, exactly as water waves are reflected.

Experiment shows that water waves may differ with the character of the disturbance, varying in amplitude and in wave length, and it may be well to define these terms. The amplitude is the distance from the top of the wave to the bottom of

Theodore Eitel.

the hollow between two waves, and the wave length is the distance from the top of one wave to the top of the next, or, more precisely, from any point in a wave to a point in the next wave which is in the same relative position as regards the wave motion.

The ether waves vary greatly as regards wave length, the shortest we know of having a length of about 5 ten-millionths of a millimeter (a millimeter is about 1/25 of an inch) and the longest having a length of about ten thousand meters (a meter is about 39 inches). The normal human eye, however, is sensitive only to those waves having a length between about 4000 Angstrom Units (the Angstrom Unit is 1/10,000,000 of a millimeter) and 7000 units, the shorter waves manifesting themselves as X-rays and—probably—as the gamma rays of radium, whereas the longer waves appear as heat and as the Hertzian waves used in wireless telegraphy. Since, however, as has been said, the eye is sensitive only to those waves between 4000 and 7000 units in length, those are the only ones which we need consider in relation to photography, except for a few wave lengths between 3000 and 4000 units in length, known as the ultra-violet waves, the photographic plate being sensitive to these.

Different portions of the retina are sensitive to different wave lengths, one portion being sensitive to those from 4000 to 5000, these giving rise to a sensation of violet, another portion to those between 5000 and 6000, which cause a sensation of green, and the third to those from 5000 to 6000, these causing a sensation of red. It must be borne in mind that these figures are approximate only, but they are sufficiently close for the present purpose. It has been found that the mixture of two or more of these colors, violet, green and red, in proper proportions, gives all other colors, and these are therefore known as the primary colors of light, the primary pigment colors being somewhat different.

Natural objects appear to us to have color because of a certain property which is shared by all natural substances, that is, when light falls on any object, a part of the light is reflected unchanged from the surface and a portion is absorbed and quenched, the object being visible chiefly by reason of the portion which is separated from the rest by the absorption of the substance. That is, if white light falls on a red object, a small portion of the white light is reflected from the surface, whereas the violet and green elements (white light containing all three primaries) are absorbed and quenched, the remaining red portion being reflected and making the object visible to us. Similarly, a green object appears green because the violet and red elements are absorbed and quenched, and a violet object has that color because the green and red elements are absorbed. Blue is a mixture of violet and green, so that a blue object seems blue on account of the absorption of the red and the reflection of the violet and green, and, similarly, yellow is formed by the reflection of green and red, and so on.

If, now, we have natural objects illuminated by white light, these objects appear to us to have different colors, by reason of the fact that they reflect light waves of different lengths, these waves giving rise to the sensation of color, from which it will be seen that color is not a material entity, but is merely a function of the eye. Hence, if we photograph any natural object on a plate which records only the violet element of the reflected light, on one which records only the green element, and on one which records only the red element, we will have three negatives, each of them being a record of one of the primaries, and, on printing these negatives in colors and combining the prints, we shall have a correct color record of the original subject. This method of color photography by analysis of light has been known for a long time, but it has remained for Mr. Ives to standardize it in a manner which permits of successful operation by any careful amateur.

The distinctive feature of the Hess-Ives process, which has never before been secured, lies in the fact that the three color-sensation negatives are secured by a single exposure in an ordinary camera, this end being attained in a very ingenious manner. A pack is made up of two plates and a film, the three being bound up in intimate contact, with the film between the two plates. The outer plate—the one toward the lens—is a violet-sensitive plate, and records the violet element of the light, absorbing and quenching this element in the act of recording it, but permitting the green and red to pass through. The film is sensitive to violet and green, so that it records the green element, permitting the red to pass, but not recording

PENSIVE. S. WITHRINGTON STUMP.

any violet, this having been filtered out by the first plate. The back plate is a panchromatic, and records the red element, the green and violet of course not reaching it.

The two plates and the film are developed in a standard developer for a standard time at a standard temperature, and are then printed on bichromated gelatine films, which, being developed in hot water, have varying thickness of gelatine, depending on the amount of light action through the negatives. That is, the gelatine films are thickest in the shadows and thinnest in the lights. These films are then dyed in suitable colors and are cemented together to form the finished picture. Since the thin portions of the negatives represent the absence of the particular color recorded by the plate it follows that the films must be dyed in colors complementary to those recorded by the plates. That is, the thin parts of the violet-sensation negative represent the absence of violet, so the film printed from that must be dyed in yellow (green red) and the film printed from the green-sensation negative must be printed in magenta (violet red), the film printed from the red-sensation negative being printed in blue (violet green). As has been said, this method is not new, the new features of the process consisting of the standardization and the idea of the pack, both of these features operating to remove color photography from the laboratory and to place it in the hands of the amateur, who is thereby enabled to make satisfactory color photographs with such apparatus as may be found in any well-equipped dark-room.

Personally, I feel that it is a mistake to introduce the element of color into pictorial photography, for the appeal of color differs widely from that of monochrome. In a monochrome art the appeal is mainly intellectual; that is, the effect of line, mass, and gradation is on the intellectual faculties rather than on the senses, whereas the appeal of color is purely sensuous. Inasmuch as photography is preeminently fitted to render line, mass and gradation more finely than any other graphic art, it would seem that it is peculiarly adapted to the expression of intellectual qualities—to the expression of ideas rather than to a mere sensuous appeal. It is true that color is not necessarily detrimental to intellectual expression—it may even be of assistance—but the mental attitude of the colorist

A SHADY COURTYARD.

W. S. WHITE.

is so different from that of the worker in monochrome that only a great genius can successfully combine the two.

Further, the proper use of color demands long and careful study, beyond what most photographers are willing to give, with the result that most color photographs are anything but satisfactory from an artistic point of view. Nevertheless, it cannot be denied that if any one wishes to do pictorial work in color the Hess-Ives process offers by far the finest medium which has yet been placed on the market, this being due not only to the fact that it is the first medium of the sort to give prints for examination by reflected light—except for certain difficult and laborious methods—but also that it offers the possibility of local modifications both of value and color, this latter fact being of great importance to the pictorialist. So far as the scientist is concerned the process would seem to offer great possibilities, though it is at present limited by the fact that when critical definition is required a special camera must be used. This, however, is of no importance to the pictorialist, who never requires critical definition, and, in fact, greatly prefers not to have it. In considering the matter of definition, it is worthy of note that when using a lens having chromatic aberration—such as the Struss Pictorial Lens—one would expect, on theoretical grounds, to find a marked color halo, but this does not appear to be the case, the lens merely operating to soften the definition generally, as is the case when such a lens is used for monochrome photography.

One drawback to the process from the point of view of the pictorial worker is that the surface of the print remains approximately that of a matt collodion print, it being at present impossible to employ papers of rough texture. This objection, however, will doubtless be removed shortly, since the manufacturers are now working on a modification with that end in view. It would seem, though, that even as the process stands at present it should have considerable vogue in portraiture, for it is possible to produce results closely approximating the appearance of miniatures on ivory, with the advantage of reproducing accurately the coloring of the subject.

It is well known that color appeals strongly to the layman—even more than to the artist—and for this reason the process should be very popular among amateurs. The chief difficulty in manipulation lies in the printing—it is not a great difficulty, however—and for this reason the manufacturers have instituted a developing and printing service, to enable any amateur to make his own selection of subject and exposure, and have the plates finished at a moderate charge. It may be said that the results given when the manufacturers make the prints are far superior technically to the black and white prints given by the usual photo finisher, being, in fact, satisfactory to the most critical worker.

To summarize, the writer feels that the highest expression of photography is found in black and white, but if anyone wishes to work in color, either for the sake of the sensuous appeal or for record—whether scientific or pictorial—there can be no question that the Hess-Ives process affords at once the finest results yet attained and a method which is quite within the capacity of the average amateur.

RAIN. MARTIN VOS.

HATS OFF!

By C. H. CLAUDY

SO simple and so easy has amateur photography been made that few who indulge themselves in its simpler forms ever have forcibly brought to their attention the fact that the whole art rests on a basis of efficient manufacturing. The button presser, the man who lets some one else "do the rest," even the amateur who enjoys the simplicity of gas light printing and the ease of development via a tank, is little apt to see anything behind the convenience of his tools, except the master knowledge of the scientist who has made them possible.

While all who press bulb or develop negative owe a debt to the optician, the lens maker, the chemist, the physicist, and the inventor, which we not only never can but rarely try to pay, it is the manufacturer, rather than the scientist, who has made our art possible for us.

To the manufacturer we owe the commercial possibility of making pictures at all. Destroy all our knowledge of *producing* cameras, films, papers, chemicals, and leave us with but the knowledge that such and thus a curvature of glass, thus and such a combination of chemicals, will give us lens and plate, and we would find our art impossibly expensive. The present scribe well remembers the first kodaks, with their —to lads, at least—prohibitive price, their inefficient and delicate film, the expense of development and printing. His first camera, a very expensive one in those early days, could be duplicated for a few dollars today, and the Brownie at a dollar is far more efficient than the first kodaks ever claimed to be. Of course much of the progress in thirty years has been scientific, but a large, a very large, proportion of it has been a manufacturing process, a development of method, an increase of production and a ceaseless experimenting in factory-maintained workshops, all to produce a good camera, a good outfit of materials, *cheaply*.

The chemist devises a paper—velox or bromide, artura,

INNOCENCE.

May L. Smith.

blue print, whatever. For months he patiently experiments, trying this combination and that, developing, examining, rejecting. Finally after months, perhaps years, of effort he has a product which he believes can be made commercially practical, and which is inherently beautiful. But between his perfected experiment, and the boxes or packages of paper on a dealer's shelves is a long step. Machinery must be devised. A factory must be built. A force must be trained. Paper must be secured of a certain quality, of a certain uniformity of surface, having certain chemical and physical properties—chemically inert, physically strong—which will serve as a base. Thousands and thousands of dollars must be invested. Often materials needed by the manufacturer of the paper cannot be bought. A separate factory must be erected—and paid for—to make these materials.

Is it to science alone, or to capital and enterprise that we should pay our debt?

Amateur photography is based on film—roll film—and this regardless of who invented it, or first patented it. Roll film is the base on which the whole superstructure of pocket photography rests. To the scientists who made the emulsion and the film itself a possibility, all honor. But to what good would we honor those who invented and perfected it as a scientific possibility, if we failed to honor those who made it commercially practical to buy a standard sized, standard quality roll of film for the same price the world over? Once more it is the manufacturer, beyond the scientist, to whom we have to pay our respects when we speak of those who have made photography possible.

It was a German scientist, striving to improve the microscope, who invented or discovered the possibilities of making glass of different refractive indices by combining certain chemicals in its making. All honor to Abbe, and as much more to the glass works at Jena which give money and time for his experiments. But if there were carloads of all the glass used in the anastigmat at your door, could *you* make a lens? No. It takes a factory, a skilled workman, a scientist to plot the curve and a highly technical staff to make those curves into the multi-part lens which we use, half the time without knowing it is more than a single piece of glass. And to develop that lens and that factory, to train that staff and those experts, took money and time and—faith.

It is said that the priceless watch which Napoleon carried would not compare with a certain dollar instrument in size, convenience, or timekeeping qualities. It is certain that the one or five or ten dollar kodak of today is as far beyond those all but hand made instruments of thirty years ago as an Ingersoll is beyond an ancient "Waterbury." Again, the manufacturer, the standardization of parts, the decrease in cost which comes with increased production.

But apart from the scientist who conceives, and the factory executive who carries out, there is the inventor, or the engineer or the scientist, *who is paid by a manufacturer* to do nothing but invent and discover. No one knows how many contributions he has made in little things to the comfort and convenience of the art, but every one knows that it is progressive business which has supported him while he did it.

The same spirit which keeps a laboratory and a staff at work without demanding a commercial return in terms of days and weeks, buys liberally when outside brains produce what the public needs. The tank, for daylight all the way—who developed it for you and me? The manufacturer, not the scientist. The autographic feature, which lets us write on the film at the time what we want—did invention, science or the manufacturer make it possible for you and me? All three? To be sure. But if the patent had been *given* to you or me, could either of us have produced one single autographic back for our own instrument?

Turn where you will, to instrument, to process, or to material and honor the inventor, the discoverer, the scientist all you will. But don't stop with them—keep on a little further and lift your hat to the brains, the foresight and the broad mindedness which has for so many years seen the vision of a photography made as simple as reading a book, which has never swerved from that ideal, and which, if it has realized largely financially in the doing, has made photography fit the purse of the man in the street. Hats off to the scientist who discovers, but a sweeping bow to the manufacturers who have given the pleasure of making pictures, where we will, when we will, at our own pleasure and at our ease, to you and to me.

O. C. CONKLING.

ARTIFICIAL LIGHT IN PORTRAITURE

By T. W. KILMER

FOR many years man has been striving to produce a light that will take the place of daylight as an illuminant in photographic portraiture. He has had a hard job. Daylight is certainly in a class all by itself when it comes to using it for this purpose. Its softness, its subtileness, its actinic quality, its broadness, its various moods, all make it the ideal illuminant. Although ideal in character, it is nevertheless difficult to master, for one moment it lights your subject with a full blaze of bright light, only to be followed by a period of soft, dull light caused by a cloud scudding across the sun. Man must invent some substitute not only for this fickle quality of daylight, but also on account of its short duration in winter, and the necessity of having one's studio above the skyscrapers. Man stepped in as usual and did invent a substitute.

I have experimented at great length, and have gone all through the artificial illuminants from incandescent gas mantles to my present mode of lighting. Let me digress for just a moment on the fallacy of many of the present-day artificial lights used in portraiture. Many of them illuminate from a *point* instead of from an *area*. This is so contrary to the way that daylight does its work that it has always seemed to me to be wrong. Therefore, to my humble mind, it would seem that we should aim to have our artificial illuminant in photographic portraiture emanate from an *area,* say of *at least* four by six feet. Of course, this area should be elevated, so that its lower part is from three to five feet from the floor. Whether it should be at an angle of forty-five degrees, I will leave for others to say. Personally, I do not believe it greatly matters.

Daylight contains the entire solar spectrum of violet, indigo, blue, green, yellow, orange and red. Therefore, let us try to

Figure 1.
PORTRAIT OF A. F. BRUGMAN, M.D.
Illustrating article "Artificial Light in Portraiture," by T. W. Kilmer.

have our artificial illuminant correspond as nearly as possible to these qualities possessed by daylight. For a long time I used Cooper Hewitt lamps, their light being filtered through architect's tracing paper. This gave me many pleasing results in my amateural ramblings in photographic portraiture.

Although I obtained (seemingly) daylight quality in my negatives, there was just a little indescribable *something* which my Cooper Hewitt negatives lacked. Personally, I think the Cooper Hewitt light the best single artificial illuminant for photographic portraiture, and had I not used it in combination with a few 100 watt nitrogen lamps, I would still be getting the excellent results I formerly obtained by its sole use.

There is quite a little trick of balancing the Cooper Hewitt nitrogen lamp combination. If you use too much Cooper Hewitt you will have your subject showing the characteristic color, while if you employ too many nitrogen bulbs you will get your light too yellow. Turn on your Cooper Hewitts, and then add 1, 2, 3, 4 or more 100 watt nitrogen lamps to your Cooper Hewitt illumination until your subject looks as though he was lighted by *daylight*.

I fail to see any difference in negatives made by daylight from the ones made under this combination of light. I make no priority claim to this combination, for I understand others are obtaining similar good results. Personally, I diffuse the entire light area by the use of architect's tracing paper.

The two appended contact prints from 8 x 10 negatives speak for themselves (Figures 1 and 2).

Figure 2.
PORTRAIT OF G. RALPH JACOBY, M.D.
Illustrating article "Artificial Light in Portraiture," by T. W. Kilmer.

THE CHOICE OF A CAMERA FOR ILLUSTRATION PURPOSES

By BAYARD BREESE SNOWDEN

ONE is occasionally asked to advise what camera, or type of camera, should be purchased for illustration purposes; that is, for making pictures intended to illustrate articles and books. The subject is one of very great interest to scientists, lecturers, and writers of almost every sort. For instance, I know a writer whose name appears very frequently appended to articles on a great variety of topics in the magazines and weeklies having the largest circulation, and while but few of these articles happen to be illustrated by the author's photographs he tells me that he finds the seven or eight thousand pictures which he has made in various parts of the United States, of constant use to him in the writing which he does. His pictures form a visual record of ideas and experiences which he is all the time turning over and working up into new articles on one subject or another. This is an example of the indirect value of a camera to a writer, and I mention it here because to many who contribute to the press the making of photographs which cannot be directly used as illustrations sometimes seems like waste.

The writer referred to uses four different cameras. This also deserves mention, because in the last analysis there is no one type of instrument which is really best, even where one restricts himself to the same general line of photographing. So much depends upon the conditions and circumstances under which the photographing is to be done, that the requirements for different cases will vary widely.

After all preliminary reservations have been made, however, it is possible to lay down a few principles which should guide the prospective purchaser and keep him from swallowing whole the advice, or rather prejudice, of the first camera user whom he meets.

The best camera for the purpose named is obviously the

PORTRAIT.

Harry D. Williar.

camera which will most easily and most satisfactorily produce the kind of pictures needed to meet the demands of book and magazine illustrating. The first point to consider, then, is the matter of size. Here we must think of the editor's point of view. A good deal depends on whether his magazine is of the large-page style. If it is, he will naturally want larger pictures. On the whole, however, the average editor seldom wants anything larger than 5 by 7 for straight photographs intended as illustrations for articles. In most cases postcard size is entirely adequate, and unless the pictures are intended to dominate considerably over the reading matter something smaller will generally do. It should not be overlooked that if the picture itself is clear and clean the engraver can enlarge in making the half-tones, though the editorial preference is usually to reduce.

The picture of postcard size is a popular one in most editorial offices, and for a number of reasons. In the first place, it is convenient to handle; in the second, it is large enough, and is made with a lens of sufficient focal length to show up details clearly; and in the third, it is also large enough so that if the editor wishes to trim a little he will still have enough print left to get a cut from satisfactorily. In general, it may be said that a print of postcard size most nearly approximates the average dimensions required in a cut, this fact greatly facilitating the editorial judgment as to the availability and desirability of the picture.

However, these considerations are in large measure offset by the circumstance that a folding hand camera of postcard size is a trifle large for comfort, and, being large, tends towards economy and hesitation in the making of exposures. The larger a camera, the more compelling must be the certainty that the subject selected is going to yield a picture one is going to want. From this standpoint, a large camera may be an actual impediment to the worker, for, however true it may be that careless snapshotting is always to be avoided, it is an undoubted fact that many a picture hastily decided on and made almost on the spur of the moment, because the expense or effort involved is too small to be considered, proves just the picture that one likes the most and finds most useful for purposes of illustration.

Where this is found to be the case, one of two courses, or both, are open. The first is to drop down a size or two lower, the new 2C size being perhaps the most satisfactory compromise that one can reach. In this 2C size some excellent instruments are now being made, among the very best of which, to my mind, is the Seneca Chief, which is well put together and offers an unusually happy combination of desirable features for anyone who enjoys handling and using an instrument of precision. Among these features may be mentioned the vertically and laterally sliding front, the spirit level, and the thumb lever for easy and accurate focusing, all of them important features for the photographer who wants versatility and speed of operation under widely varying conditions.

The other course, which is one that an increasing number have resorted to, is to choose a high-grade miniature camera taking pictures say 2¼ by 3¼ inches in size, falling back on enlargement for obtaining the prints finally decided upon for illustration. This method is a good one in that more negatives and therefore a wider selection of pictures will be obtained, but as it necessitates enlargement there are many who for one reason or another will not care for it. If a person is nine-tenths a writer and only one-tenth a photographer, the enlarging requirement may prove very irksome, and generally does.

However, even for a person so disposed, the addition of a miniature camera to the field outfit will be found exceedingly valuable and helpful. If he makes this extra provision, the larger camera, say the 2C, can be used for getting the more pretentious views and the miniature used for supplementing the latter with quite a number of incidental or episodical pictures which will add materially, even as contact prints, to the general display. And then of course, if some of these little pictures prove to be especially fortunate and pleasing, they *can* be enlarged.

In conclusion, it may be suggested that the writer or scientist who takes up photography for the purpose of making illustrations for his books or articles should observe that the successful use of a camera for this purpose demands both time and study. He must learn to see pictures where pictures are, and to make the negatives with accuracy and skill. In other words, it is not enough to buy a suitable camera, or cameras; it is even more important to learn the art and practice of photography, which amounts to considerably more than the "push-the-button" operation that many suppose it to be. But over against this caution we may set the statement that the learning is well worth while, for not only is the sale value of a manuscript greatly increased by pictures, but, also, the satisfaction of enforcing or embellishing the written word with pictures—good pictures—of one's own making is itself a reward for all the additional effort involved.

Gill & Son.

UP THE POTOMAC WITH A CAMERA

By DR. R. W. SHUFELDT

(Illustrated by seven photographs by the author)

DURING the spring—the very spring—of 1915, accompanied by my wife, and carrying an old-fashioned tripod camera, I made several trips up the Potomac River with the view of getting some scenes of that part of the country. If Washington be one's starting-point—which it invariably is with me as my home is in that city—there is but little choice as to which side of the river one selects for a tramp, for it is a charming country to explore at all seasons of the year, but especially at the time the vernal season is just opening.

Most photographers with modern equipment would smile at the outfit I pack along upon such trips, for it consists of an old Blair Tourograph box, of the date of 1879, fitted to a more recent style of tripod; while the lens—ah! the *lens,* there's where half the secret of success lies, and mine is an old-style Voigtländer No. 1, which I got in Berlin thirty or more years ago. Were that old lens able to speak, it would be not only a very unusual, but most assuredly a very interesting story it could tell; for, if I have made one exposure with it, I have certainly made over twenty thousand—the range of subjects running all the way from the artist's model to the nest of a humming bird with the two callow young in it. I am not ashamed to say that I have never owned any other lens, and, what is more, I never want to.

At the "District Line," on the Maryland side of the river, there is a well known spot, about a quarter of a mile above "Chain Bridge," which is familiar to nearly every rambler in the District of Columbia and for leagues about in the

Figure 1.
SCENE ON THE MARYLAND SIDE OF THE POTOMAC.
Illustrating article "Up the Potomac with a Camera," by Dr. R. W. Shufeldt.

adjacent territory. It is on the old Georgetown Canal—a beautiful locality in the early spring. As we passed it one day, three interesting little urchins ran out to meet us; and, as the camera was in position, Figure 1 of the present article was the result.

Fine timber, composed principally of sycamores and maples, with other trees of this section of the country, form here a piece of woods of very respectable extent. When the migration time for the birds is on—either the vernal or the autumnal one—many beautiful species occur in this region, several of which one never sees in the northern woods, even as far south as the rural districts around New York. Among these perhaps the Cardinal Grosbeck is the most conspicuous; but this elegant, scarlet fellow, with his rich, coral-red beak, does not entirely eclipse the Scarlet Tanager—which latter does migrate far north—for the entrancing notes of both may be heard together, as they are poured forth upon some beautiful May morning at sunrise, in the very place reproduced in Figure 1. Up to date I have not obtained the nest of the Cardinal with young in it; but I have secured several very beautiful ones with the eggs.

As one would naturally suppose, there are not many wild animals left in this part of the country—that is mammals—for the gunners have exterminated them long ago—so close to the city. Possibly, by a rare chance, one might meet with some cautious old raccoon toward nightfall; but it would be worthy of record should it happen. Perhaps a 'possum might be found, which would be an equally rare occurrence.

Still, while we may not be able to photograph many birds or other living forms up the Potomac, this does not apply to the botany of the region; for flowers cannot get away, nor are they readily exterminated by man. With this article I am only going to give one flower picture, for I have other things to show; my flowers can well wait and be exhibited upon some other occasion.

When the season first opens, there is a most interesting flora all along the Potomac—upon both sides of it; and as I write these lines on a cold December evening, I long to have that most charming time of the year with us again. Along the streams and up the hillsides grow the wind anemones,

Figure 2.
EARLIEST INDICATIONS OF SPRING.
Illustrating article "Up the Potomac with a Camera," by Dr. R. W. Shufeldt.

the bloodroots, the wild geraniums, the bluets, the saxifrage, and a perfect garden of other flowers.

A characteristic bit, typifying the very earliest days of spring along Potomac's bank, is seen in Figure 2, which I secured principally to show the elegant, umbrella-like leaves of the mandrakes (*Podophyllum*) as they burst through the winter's carpet of dead oak and chestnut leaves, which has thickly covered the ground beneath those trees from late autumn till early spring; and big patches of these mandrakes may be seen along the banks of pretty streams and up through the woods even before the first crow blackbirds come trooping back from the south.

Figure 3.
ONE OF THE LARGER ISLANDS IN MID-STREAM.

Many people have an idea that the Potomac River is both wide and deep for many miles above Washington; but this is entirely an erroneous notion. Hardly has one proceeded less than a quarter of a mile above the antiquated Aqueduct Bridge at Georgetown, before this historical stream narrows down to such an extent that the only craft ever seen there are the club canoes and rowboats; in fact, it is rare to see even a small sloop in that part of the river. Still higher up—that is, within a very few miles—the character of this river gradually presents various interesting changes; small islands are seen, often in mid-stream. Some of these are bare rocks,

Figure 4.
VIEW UP ONE OF THE TRIBUTARIES OF THE POTOMAC.
Illustrating article "Up the Potomac with a Camera," by Dr. R. W. Shufeldt.

while others, more extensive in area, support vegetation of various kinds; or, where of considerable size, they may have a number of large trees growing upon them. Such an island is to be seen not a great ways from Great Falls, and I secured a beautiful photograph of that one to illustrate the present article, it being reproduced in Figure 3.

At various points up the Potomac, streams and creeks—those of some size as well as more modest little brooklets—feed the river. As a rule they enter it directly at a right angle; and some of the small ones are within the District limits, while others join the river on the Virginia side as well as on the Maryland side. One or two of these streams are very beautiful at any time of the year; indeed, they all are, almost without exception. Where they have the greatest attraction for me, however, is when I find one of them tumbling over rocks and stones, old half-sunken logs, and brush and woodsy debris of all kinds, pitching down hill through the early spring woods, and then, just before delivering its contribution to the old Potomac, becoming suddenly smooth and placid, coursing over a piece of meadow land, catching its breath, as it were, prior to losing its name and being absorbed in that of another and a far wider known one (Figure 4).

A little further up the Potomac, it, too, very soon has a rocky bed with rocky sides to tumble over as best it may. Then, just above Great Falls, both of its banks come to be composed of great masses of water-worn rock and hundreds of massive, isolated boulders. Through and over these, this river tumbles and plunges on its way, in its haste to where it can proudly lave its banks opposite the nation's Capital.

Great Falls, on the Virginia side, is a very popular resort for Washington folk through all the warmer months of the year. A few hundred yards from the station, there are two or three great, jutting promontories of rock, upon which have stood, in time, thousands of visitors to this spot. One of these rocks is especially conspicuous and of massive proportions. It has been fitted up with a few seats and a big flashlight to light up the river at night. Upon this there have stood, in years gone by, some of the most widely known characters in American history—yes, scores of them; doubtless General

Figure 6.

SECONDARY FALLS.

Illustrating article "Up the Potomac with a Camera," by Dr. R. W. Shufeldt.

Washington himself has stood there any number of times, for he had built a mill not a hundred feet away from that very spot. And if Washington stood there, one can easily imagine who, among his host of friends, must have stood there *with him* from time to time.

Below this promontory there are great, bossy ledges of rock, several hundred feet above the roaring river below. One of these admitted of my placing my tripod upon it, and from that point I obtained the result shown in Figure 5; a little lower down, on another ledge and with not quite so secure a position, Figure 6 was obtained.

When the heavy rains come in the spring and autumn, the Potomac looks very different from what it does in these last two figures; for, from a comparatively modest river, at this point as well as below, it is very rapidly converted into a great, roaring, muddy torrent that ruthlessly plunges along on its way to the Atlantic.

But December is with us now; and what I am looking for is to have old Winter come along this far south with a good snowstorm or two; then I hope to capture some January or February views that may be reproduced here in some future issue, in that it may be appreciated how old Potomac appears in its winter dress.

Figure 5.
THE RIVER ABOVE GREAT FALLS.
Illustrating article "Up the Potomac with a Camera," by Dr. R. W. Shufeldt.

THE FLOWER GIRL. A. B. HARGETT.

A CONVENIENT METHOD OF MATTING LANTERN SLIDES

By FRED W. SMITH

IN making lantern slides, other than by contact methods, it is convenient to have all photographs brought to the same size on the lantern slide plate. This gives a much more pleasing effect than where there is a continual variation in size of the projected picture. Because of this fact amateurs often purchase mats with a uniform opening cut in them. When it comes to reproducing negatives where for some reason the sizes of the positives must vary there is considerable trouble to cut the openings so as to fit the pictures and not show ragged edges. There is also to be considered the cost of the mats. Where a person is turning out a large number of lantern slides this cost is well worthy of consideration.

In order to meet these various troubles I have been for some years making all my mats on lantern slides photographically. In order to do this I have a clear sheet of glass mounted in a hinged plate. To the center of the glass is attached a piece of opaque paper—made from the black paper in which plates or developing paper is wrapped—cut so that it is just a trifle smaller than the positive picture that has been printed upon the positive lantern slide plate. The printed lantern slide plate is placed under the glass bearing the opaque paper and exposed for a few seconds. Upon development it will be found that a perfect mat has been formed upon the plate.

This form of mat lends itself to printing on titles, name of maker, etc. This is done by writing or printing upon strips of celluloid placed outside of the opaque paper when the mat exposure is made. In mounting a strip of white paper is so placed that the letters on the positive may be read. Where no titling is used, the positive and cover-glass come into close contact and a thin slide results with little danger of distortion or unequal strains. Where the slides are to be water colored this method of matting is particularly good as no amount of color running over the mat will have any effect.

JOHN BURROUGHS AND GRANDCHILDREN. ALICE BOUGHTON.

MAKING AUTOCHROMES BY ARTIFICIAL LIGHT

By CHARLES J. BELDEN

THE screen plate method of color photography, whether it be the Autochrome, Paget, or any other practical process, has long since ceased to need introduction or explanation to either the professional or amateur photographer; but like a great many other branches of photography there are certain phases of natural color work that have received the attention of only a few experimenters. This is perhaps only to be expected, for the ramifications of the process that produces all the colors are bound to be greater than those of a process whose results are in monochrome, and the problems of the former will of course require more detailed study.

The autochrome process, which was placed on the market some ten years ago, has enjoyed a widespread and deserved popularity chiefly among non-professional photographers, although a considerable number of studios have from time to time taken up autochrome portraits as a side issue. The bulk of autochrome photographers work the process purely for the pleasure derived. This condition has been brought about chiefly by the fact that the color plate is a little more difficult of manipulation than its black and white brother, both in the taking and in the developing, and the impression has been gained that its application is too limited. This is perhaps true to a certain extent, just as it is true in monochrome work that the best results are obtained under right conditions of atmosphere and lighting; but it has been the writer's experience that the autochrome has far greater possibilities than ordinarily supposed. During the past few years the scope of commercial photography has expanded steadily in all directions, but workers in this field have been slow to recognize the opportunities offered by photography in natural colors. The supposedly restricted field of color photography is responsible for this condition, for a process that is not of uni-

SAND DUNE COUNTRY. Fedora E. D. Brown.

versal application does not readily find favor with the commercial photographer.

Volumes have been written on the exposure and development of the autochrome plate under normal conditions of lighting, with the result that this phase of the subject is pretty well understood. With a little experience, the percentage of failures with landscapes or other out-of-door work need be but small, notwithstanding that these plates require a very exact exposure for good results. Even more certain results may now be obtained in portraiture by the use of certain brands of flashlight powders manufactured especially for use with autochrome plates. By using a given weight of powder, under fixed conditions, the question of exposure is of course eliminated and any variation in quality or intensity of light is dispensed with.

Exceedingly beautiful results may be secured by this means, and detailed instructions for manipulating the plates under these conditions are readily obtainable. When, however, there arises the problem of making an autochrome by other than daylight or flashlight, the average photographer will probably throw up his hands without giving it a thought. Thus, a very interesting and, what could be to the commercial photographer, a very profitable field is allowed to remain almost untouched.

It is not the purpose to discuss here the theories of light and color as applied to the autochrome plate, but to suggest merely what may be accomplished practically and simply, under conditions of artificial illumination. It need hardly be stated that the color rendering of an autochrome is entirely dependent on the spectroscopic qualities of the light that reaches the plate. Only too often have most of us been reminded forcibly of this by the weirdly blue results obtained, when the compensating light filter has been forgotten. The light filter is employed for the purpose of correcting the predominating blue sensitiveness of the plate, and the color of the screen used for daylight exposures is such as to cause the color rendering of the plate when viewed by daylight, to be a very close reproduction of the original subject.

It is not difficult to imagine, therefore, that any change in the quality of the light would theoretically require a change of screen. This is brought out strongly by the rendering of deep shadows; of course all shadows are blue—black does not exist in nature for the artist—but this feature is always exaggerated by the autochrome, for the principal reason that the shaded portions of a picture are illuminated by light reflected from objects which alter its composition. Therefore the balance of the light filter is destroyed. Strange and unexpected results are often obtained in pictures made by light reflected from a colored surface.

A large number of formulæ have been suggested for autochrome light filters for use with various illuminants, but the making of a light filter is an exceedingly delicate and exacting operation. It has been the writer's experience that by the judicious use of two or three standard filters, excellent results may be obtained. In the first place there is the standard daylight screen, secondly there is the so-called "perchlora" screen adjusted for use with the "perchlora flash powder," and thirdly the magnesium screen for giving correct color valuês in exposures with magnesium flash powder. All of these screens may readily be obtained and are standard products of the manufacturers of the autochrome plate. After a few trials along the lines to be suggested it will be found that beautiful effects may be obtained by artificial lighting.

One of the first problems that baffles the autochrome worker is the photographing of interiors. The difficulty here arises from the altered color rendering of objects illuminated by light reflected from some colored surface and also the inability to get daylight into some remote corner. Artificial lighting of the dark corners may suggest itself, but the false reproduction of colors will be quite obvious. A very simple solution is found by making one exposure by daylight with the regular screen, then drawing the shades and lighting the dark portions artificially, make an exposure with the perchlora screen. A very haphazard sounding process to be sure, but in the writer's experience productive of excellent results. In a number of cases fireplaces have been photographed in this manner, with glowing embers reproduced very faithfully. Brightly burning logs may be photographed successfully on an autochrome by exposing for fifteen minutes at F/8 through a perchlora screen.

SPEED. THOMAS CARLYLE.

Making autochromes of electric lighting fixtures is very interesting and not as difficult as it might seem; in fact the first plate the writer exposed on a subject of this class proved to be nearly a perfect reproduction. An exposure was first made on the fixture lighted from the inside by incandescent bulbs. With the lens working at F/8 a fifteen minute exposure was given, half of it with no filter and half with the perchlora screen on the lens. Two charges of perchlora flash powder were then set off on either side of the camera; the color rendering in the result was almost faultless.

During the Panama-Pacific Exposition I had occasion to make a considerable number of autochromes of the night illuminations, this feature being of a most spectacular yet artistic nature. The buildings, in which were incorporated wonderful harmonies of color, were illuminated at night by an indirect lighting which produced an inconceivably beautiful effect. Autochrome exposures through the regular daylight screen were, of course, out of the question and as an experiment an exposure was made through the perchlora screen. The result was most satisfactory.

A series of night autochromes was consequently made of all the buildings. In a few cases short exposures were made with the regular daylight screen before dark, and exposure completed with the perchlora screen after the lights were turned on. This method proved even more satisfactory than the first and the added trouble was fully repaid.

In making autochromes within the Exposition buildings, of the exhibits lighted partly by electricity and partly by daylight, it was found that the perchlora screen gave a color rendering that was well nigh perfect. In cases where daylight predominated the magnesium screen produced excellent results, in other cases where most of the illumination came from incandescent lights, the exposures were made partially with the perchlora screen and partially with no screen at all.

The mode of procedure which has been suggested above will undoubtedly seem to be a "hit and miss" and expensive process. Having been worked out, however, on a practical basis, it has proven most successful and has produced results which the average autochrome worker would scarcely believe possible.

A WESTERN SCENE. HILDA ALTSCHUL.

INDOOR SNAPSHOTS

By L. O. BOGART

AT the very mention of the above subject I hear some one remark: "Impossible! It can't be done." But, like the feat of the magician, when the trick is revealed, we invariably say, "How simple." So it is with the making of snapshots indoors, provided, of course, the equipment is suitable.

Were we to define the word "snapshot" we might correctly say that it is an exposure that will cause the image of a moving object to be impressed upon a sensitive plate so that it appears as one that is still. If this be so, then whether it be the one-thousandth second exposure used to stop motion in the picturing of a racing automobile, or the one-tenth or one-fifth exposure used in taking baby pictures, both would properly come within the definition of a snapshot.

Granting that the sole use of the snapshot lies in stopping motion, it would have little general use in portraiture, other than for one class of work, and that the photographing of his squirming highness—"baby." Someone has said "that the most excellent use of photography is portraiture," and what class of portraiture is of such interest and value as that of children. Even the little kodak pictures taken in the glaring sun of the backyard, that today are passed over hurriedly and put aside will, when Bobby has laid by childish things and sister has replaced her pinafore with a gown, have increased in value more rapidly than we anticipated.

We grown-ups would give a good deal for something more substantial than mental pictures of our childhood days, and wouldn't it be great to see ourselves as others saw us.

After a gradual trying out and selecting covering many years, the writer has found the reflecting type of camera to be par excellence for this most delightful branch of photography. To quote the advertiser, "you see the image right side up the way it will appear in the photograph."

MISS S. M. S. WARFIELD.

Some day there will appear upon the market an instrument that has all of the good features and none of the faults so common to many of the cameras now sold.

The lack of a swing back on the reflecting camera is but slightly compensated for by the rising front, and the noisy focal plane shutter makes a short time exposure of children almost impossible to accomplish without movement, due to the child's attention being drawn to the snap of the curtain. However, the shortcomings of the reflecting type are more than offset by its many good points.

For children, its low view point is ideal, especially so when Billy Boy refuses to be natural unless he be allowed to play train on the nursery floor.

Few of us profit by the experience of others in the selection of photographic apparatus, and perhaps it is well so, for the road from the first Brownie to the mastery of the modern anastigmat is fraught with many disappointments and mistakes, the overcoming of which add to our wealth of photographic knowledge.

To understand the failings of the fixed focus box camera is to be able to properly and judiciously use the many attachments of the more expensive and up to date instruments.

As to exposure, the oft repeated and fundamental principle is "expose for the shadows," but when shadows do not exist we cannot expose for them, and if we can eliminate the deep shadows, we can decrease the time of exposure considerably.

Herein lies the secret that makes indoor snapshots possible. To keep the key of the picture high, by the using of light backgrounds, white ground cloths and reflectors; to use broad flat lightings; in fact, to work for a maximum of light both direct and reflected, to the end that there be no heavy shadows.

Care must be taken to avoid cross lights due to direct light falling on the sitter from opposite or nearly opposite directions.

With the diaphragm set at its full aperture of F 4/5, and the focal plane working at one-tenth second; with all the light available so diffused and reflected as to dispose of deep shadows; with subject placed in a comfortable position close to the source of illumination, we may let the bars down and walk boldly out into the field of child portraiture with little fear of failure.

SUMMER CALM. Peter J. Schweickart.

A portrait should be not only a correct likeness, but should present the subject in a pleasing pose. To secure this does not necessarily mean that we must pose the little subject by rule of thumb methods. When we were youngsters, didn't we just hate to have some one constantly fussing with us, pulling down waists, straightening neckties, or slicking down a refractory cowlick, and saying "don't do this," or "don't do that." We must bear in mind our own childish likes and dislikes when working with children.

If ever one could be persuaded to agree with those who decry posing the figure as unjustifiable, and doing more harm than good, it would be in the portraiture of children, for childhood's chief charm lies in its freedom from pose.

Baby never plays to the grandstand. He has more natural and characteristic poses than a fox has tricks; so, if you would get life-like pictures you must be ever on the alert, and watch the sitter and not the screen. For with face buried in the focusing hood it is extremely difficult to watch the expression. A child may be exceedingly homely, even ugly, but he or she will always have some quaint way or attractive expression if you will only have the patience to wait.

In the portraiture of children the truth of the quotation "patience is a virtue" is proven beyond question.

The photographer must learn to think quickly and in order, bearing in mind the result for which he is striving, as in the portraiture of grown ups, likeness, and the revelation of personality or portrayal of character, are vital elements and cannot be overlooked. He must use all his knowledge of line and space arrangement, so that in composing the figure properly fits the picture space.

Aim to secure variety and naturalness without strain and awkwardness. Remember that vertical lines mean support; horizontal ones and long curves, dignity and repose; angles, action and unrest.

To one who would for the first time take up photographing of children, I would advise the purchase of a good textbook on "Posing the Figure." For while one's own experience will be worth many such books, the cost will be many times as much as the textbook, in wasted materials that could have been saved by avoiding one of the many pitfalls into which the beginner usually blunders.

NIGHT LIGHTS

By CHAS. M. SMYTH

THE thought presented by the above subject to the mind of the reader will depend largely upon his present abode or upon the nature of his past experiences. For instance, to him who abides in the country "night lights" may mean a little square spot of light back among the trees where everything surrounding is in pitchy blackness. His success in reaching that lighted window, or doorway, without a skinned nose, or a broken shin, is accomplished only by his acquaintance with the pathway and not because of the light being bright enough to enlighten his way. Maybe other lights are presented to him, such as the flashing of the fireflies which seem bright only by contrast with the inky blackness all about. A light from the window of a distant neighbor may catch his eye, or the faint glow from a far-away brush fire may attract his attention. Maybe it will be that wonderful, always enchanting and brilliantly lighted limited railway train, speeding up the valley with a roar, with that dazzling arm of light feeling its way ahead along the roadway, and with light streaming from the windows of the trailing coaches, giving him a fleeting glimpse of the great world without.

"Night Lights" to the smelter man or to him in the steel mill will mean a row of belching chimneys inside a stockade, or those withering blasts from the molten metal or slag, blinding and always dreadful. Or it might mean a dingy and smoke-filled room down at Casey's, where the bar is bright and sparkling, but where the corners are dark retreats that offer seclusion from the glamour of the lights when one's pockets are empty and head's awhirl.

To him in a village or small town "night lights" may mean a multiplicity of things, such as the flickering street lights casting grotesque shadows across the walk, or maybe the lights streaming from the windows of some mansion with

Figure 1.
Illustrating article "Night Lights," by Chas. M. Smyth.

gaiety within. It might bring to mind the brightly lighted lobby of the best hotel in the town, the bright window display of a leading haberdashery, a grotesquely lighted market place, or the enticing lights of some oft frequented ice cream parlor. Here there are so many and various conditions of light to be found that the "picture" presented to the mind of the inhabitant will depend upon his habits, or the manner in which he is accustomed to spending his evenings.

But to him living in the metropolis "night lights" will mean only one thing—the Great White Way, where the throngs wend their way each night on pleasure bent; where the crowds surge back and forth beneath the bright lights, always some going away and always more pushing their way in—precisely as the night moths do about the street arc light. Here the lights are brightest and, dimming all others in comparison, leave a picture of brilliancy indelibly upon one's mind.

Among the readers from each or all of the foregoing localities—whether it be city, town or country—there will be found individuals who are photographically inclined, and to these the lights and shadows of the night give impressions similar to those derived from the sunlight and shadows of the daytime. The lights and shadows of night are apt to be the more fascinating because the artificial light is soft and restful, like subdued music, and the shadows are more curious and impenetrable. These persons look at any light from a different point of view, and with a clearer understanding than those who have not given photography a thought.

Light, from whatever its source, is life and varies only in its intensity. Shadows and darkness are only an absence of light. Natural light in the daytime has the greatest range of variation because of its far greater intensity in the height of a clear day, but is capable of diminishing until the total darkness of night is reached. Somewhere in that scale a point is reached where the sensitive plate we have today will fail to record an image, except on very, very long exposure. As the scale is ascended and the light increases the exposure is shortened until we are capable of getting an image with the fastest possible shutter.

Because of the fact that we have not yet devised a light meter that will toll off the degrees of light somewhat after

Figure 2.
Illustrating article "Night Lights," by Chas. M. Smyth.

the fashion of the thermometer that accurately measures the degrees of temperature, we must depend upon mechanical instruments that rely upon the judgment of the eye, and any one of them is inadequate when attempting to measure artificial street, store or house lighting.

For that reason it will be impossible for one who has determined the proper exposure required in photographing any artificially lighted place to convey that time to one desiring to photograph a similar subject in a different locality. All will depend upon the amount of light generated in the artificial lighting about the subject, its distribution, the color of the light and the kind of plate used.

While the "Great White Way" of any city will furnish the greater opportunity for experimenting with the camera, it must not by any means be thought the only place where photographs can be taken with success. One can work down the scale from the scenes about the brilliantly lighted theaters, where incredibly short exposures can sometimes be made with success, taking in subjects including brilliantly lighted window displays, street scenes, attractively lighted residences, and so on, each time reducing the light on the subject until we reach the lamplight shining from the window of the farmhouse back among the trees. All that is necessary in successfully photographing any of the subjects in the scale is to shorten or lengthen the exposure according to the light.

In a former issue of *The Annual* I described a method of development which will bring out the light values in work of this nature and minimize halation to a greater extent than any method I know. It is the "Williamson method," described first in the London Photographic Journal, and is a pyro-metabisulphite solution. As it is rather lengthy to describe accurately I will not attempt to repeat it here, but have merely attempted to give the reader an idea of the light values and the length of exposure required in this sort of work by showing the length of the exposures I used in making the photographs accompanying this article.

If the proper length of exposure were arrived at by mathematical reduction from the ratio of sunlight to that of artificial light, and calculation of the distance of the camera from the artificial light, it would likely call for an exposure of many

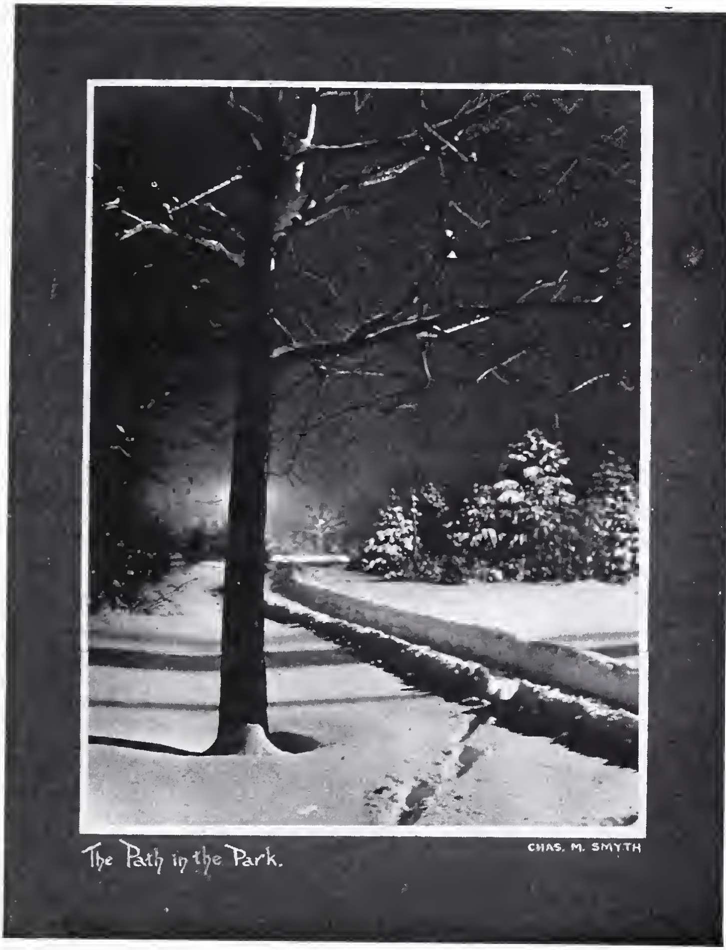


Figure 3.
Illustrating article "Night Lights," by Chas. M. Smyth.

minutes or even into the hours; but in actual practice such exposures are required only in cases where the light is very, very poor. The exposures I used in making the photographs shown herewith were incredibly short—some of them being what might be termed "snapshots." Such work while painstaking is not difficult, and anyone with a good outfit and a little patience should be able to do as well. I use a Taro Tenax equipped with Goerz Dagor lens and compound shutter.

In taking the photograph entitled "Bright Lights Along the Way" (Figure 1) an opportune moment presented itself for showing the life and animation of the street at night. A street band was playing just to the right of that portion shown in the photograph and in front of a brightly lighted theater to the right of the camera, and the lights on this theater cast their rays into the faces of those in the photograph who were watching the band. They were sufficiently quiet to allow a bulb exposure of hardly more than two seconds. In "The Book Store" (Figure 2) the lighting was considerably reduced from the one just mentioned and consequently required an exposure of seven seconds. A long exposure must not be made where the arc lights shine directly into the camera. In "The Path in the Park" (Figure 3) the lights were sparse and this exposure was of two minutes and fifteen seconds duration.

After all, the taking of photographs at night is an exceedingly interesting branch of the work, and one which a person who is very busy in the daytime will find greater opportunity to follow at night.

LILIES.

Kate Matthews.

MORE ABOUT CORRECTING HALATION IN DEVELOPMENT

By GEORGE D. JOPSON

MY article in last year's *Annual* "Halation Corrected in Development" brought forth several comments and inquiries. One complaint, and the only complaint, was that the article was too brief. The object was to give the foundation for the reader to experiment or build upon.

After a year of experimenting I am prepared to answer conclusively three of the questions that appear uppermost in the minds of the readers, which are as follows:

"Is it a necessity for one to confine the exposure to just double the ordinary exposure?" No! Ordinary exposure can be made and very beautiful results obtained, but the carbonate of soda must be eliminated from the developer after such a prolonged exposure.

"When one has no developing tank and exposes only one or two plates at a time is there any method whereby one can develop to correct halation?" Yes! Use the ordinary tray, mix the developer in the proportion according to size of tray, as given in formula in last year's *Annual* (Page 92), place exposed plate in tray, fill tray with developer, and cover to exclude light. Be sure to rock the tray every few minutes. This is necessary to keep the chemicals thoroughly mixed.

"How will this method work for portraiture by placing subject near window and exposing to include the window?" The results will be all that is desired. Most excellent home portraits can be and are made by this method.

I sincerely hope this brief article will serve to assist the progressive experimenter in obtaining non-halation results on ordinary plates by correcting in both the exposure and development.

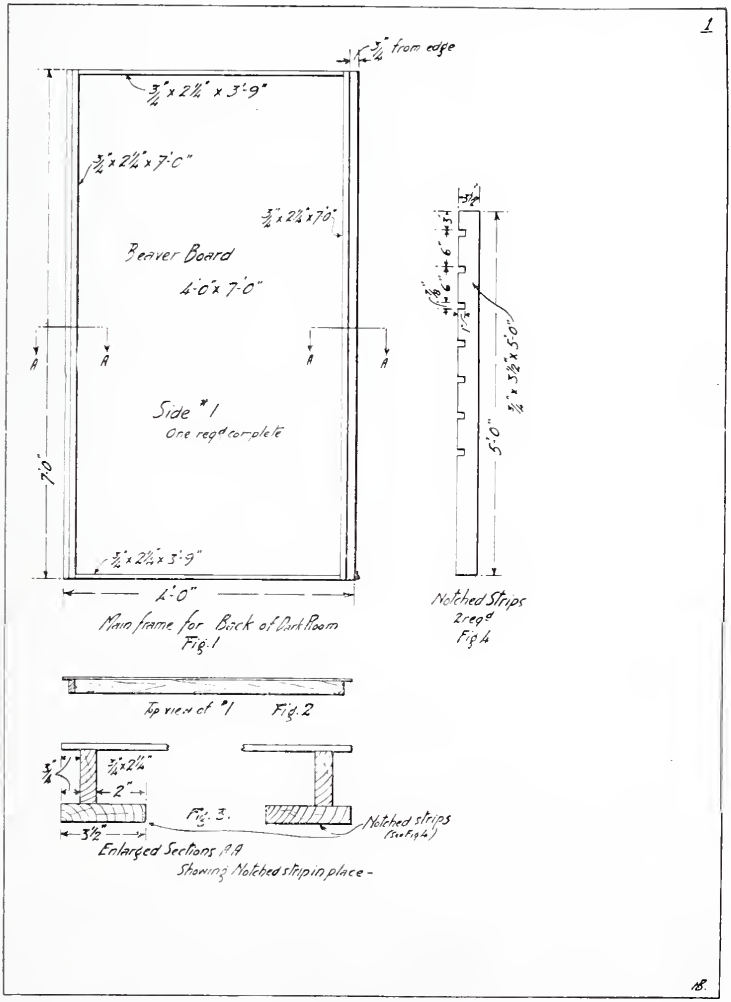
A COMBINED DARK-ROOM AND ENLARGING CHAMBER

By H. E. BALFOUR

BEING of a roving disposition, due to the nature of the work in which I am engaged, I have never been able to enjoy the satisfaction of the possession of a permanent dark-room, but have had to get along as best I could in the various houses we have occupied from time to time. I have suffered many a time, developing plates and loading plate-holders in all kinds of places: cramped up on the knees beside a bed with hands and plates under the blankets—have used a box on a table with blanket placed around box and arms—and developed by time, by persuading someone to watch the clock in another room for the seven or eight minutes required. It always required an endless amount of walking back and forth, bringing boxes and blankets, bottles and trays, and all the other junk required to develope a plate, to the box or bed or cupboard that was being used at the time, till one became almost disgusted with the job (but we never give up, do we?) and then after the plate was developed and fixed, there was that mess to clean up and all that junk to return to its place again. The wonder is that we keep it up so long.

At last I decided that I was almost, if not quite, a fool, to go on in this manner and waste an hour to do a seven-minute job; and thought of making a portable dark-room just large enough to get into. The enlarging problem then presented itself, and that would require the same amount of useless lugging back and forth before an enlargement could be turned out. Then I hit upon the idea of the combined enlarging and developing chamber described herewith.

It is large enough for comfort, light tight, can be used for loading, developing and enlarging, and can be taken apart and moved away with the rest of the furniture, and there you are. You can carry on your photographic operations without in-



Figures 1, 2, 3 and 4.

Illustrating article "A Combined Dark-Room and Enlarging Chamber," by H. E. Balfour.

terruption wherever you go—and always in the same old comfortable dark-room.

To build the chamber you will require four pieces of compoboard, or beaverboard 4′ x 7′, one piece 4′ x 8′ (or two 4′ x 4′) and some ¾″ strips from 1½″ to 3½″ wide. Side No. 1 requires one sheet 4′ x 7′, two pieces ¾″ x 2¼″ x 7′, two pieces ¾″ x 2¼″ x 3′ 9″, nail or screw these together as shown in Figure 1, and attach to your beaverboard with nails and glue, making the frame flush with the sheet at top and bottom and ¾ inch from each edge at the sides, as shown in Figure 2. Also make two notched strips as shown in Figure 4. These are to be secured to the frame as shown in Figure 3, using good sized screws spaced opposite each notch. Do not attach till chamber is assembled. Sides 2 and 3 require the framing nailed and glued on *flat* as shown in Figure 5, and enlarged detail below it—make two of this. The front, 4, is made like side No. 1, but is made in two parts each 2′ 0″ wide as shown in Figure 6 and details. The two parts are held together by three hinges along the centre-line as shown.

Figure 7 shows the four sides assembled and Figure 8 shows plan of top, with a frame of ¾″ x 2¼″ stuff as shown; this top fits into the top of the chamber holding it square and excluding light, four screws being used to hold it on. A duplicate of this is used as a floor, which may be covered with a piece of linoleum.

Figure 9 and accompanying details show the most interesting part of the design—the rising and falling table—for working upon when loading plate-holders, or for use as an "easel" when making bromide enlargements. The interesting point is the method of holding the table rigidly in place, and of allowing it to be raised and lowered at will.

When the notched strip, Figure 4, has been properly attached to Side 1, the table can be slid down from the top by passing the notched strips *between* the pieces marked "A" and "B"—and then through the notches in the table-top. When the table is lowered to the required height it is pulled forward into a notch in the vertical strip and it will remain in place. This pulling forward performs *two* functions: first, it places the proper part of the table-top into the notch so that it will not fall; and secondly, it clamps the upright strips firmly

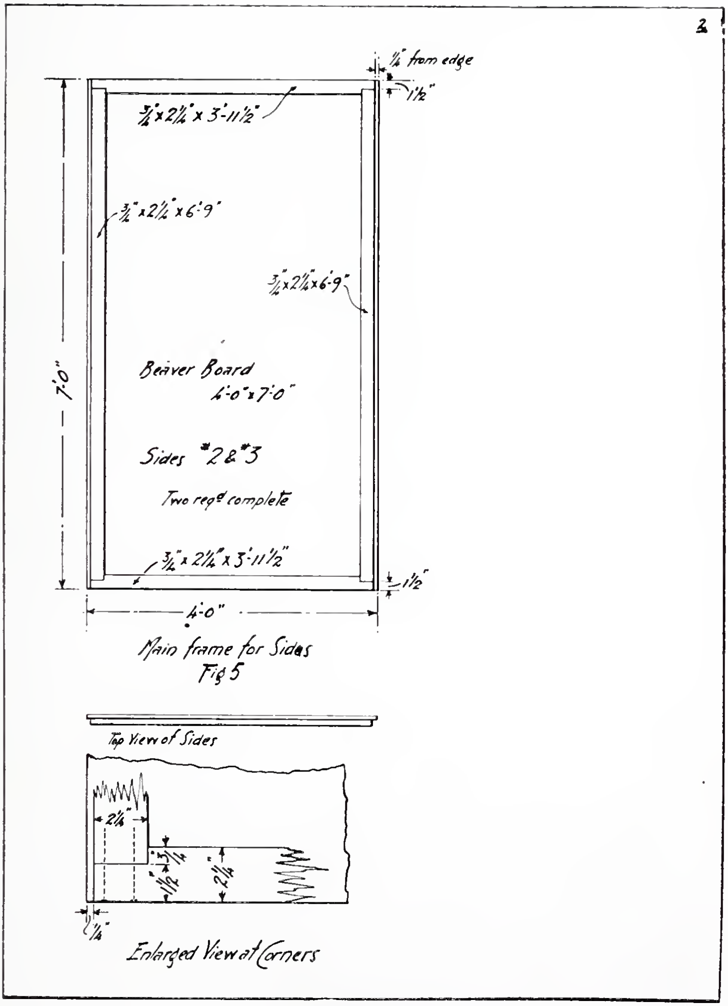


Figure 5.

Illustrating article "A Combined Dark-Room and Enlarging Chamber," by H. E. Balfour.

between the pieces "A" and "B"—see Figure 11. A couple of wedges are used simply to prevent the table-top being pushed in and allowed to fall. The weight of the table itself, and of anything placed upon it, tends to hold the top *out* into the secure position. When these parts are properly made and fitted the table is as firmly held as if it were screwed solidly to the wall.

The table-top is made of ¾" stuff with a ¾" x 1" strip of hardwood along the back; this strip takes the horizontal "pull" when a weight is placed upon the table and should be screwed on firmly. The piece "C," Figure 11, should be placed one inch from the back edge of the top, or flush with the inner edge of the hardwood strip, and should be at right-angles to the table-top, so that when the wedges are in place the table will be perfectly level. Follow the drawings carefully and a satisfactory job will result.

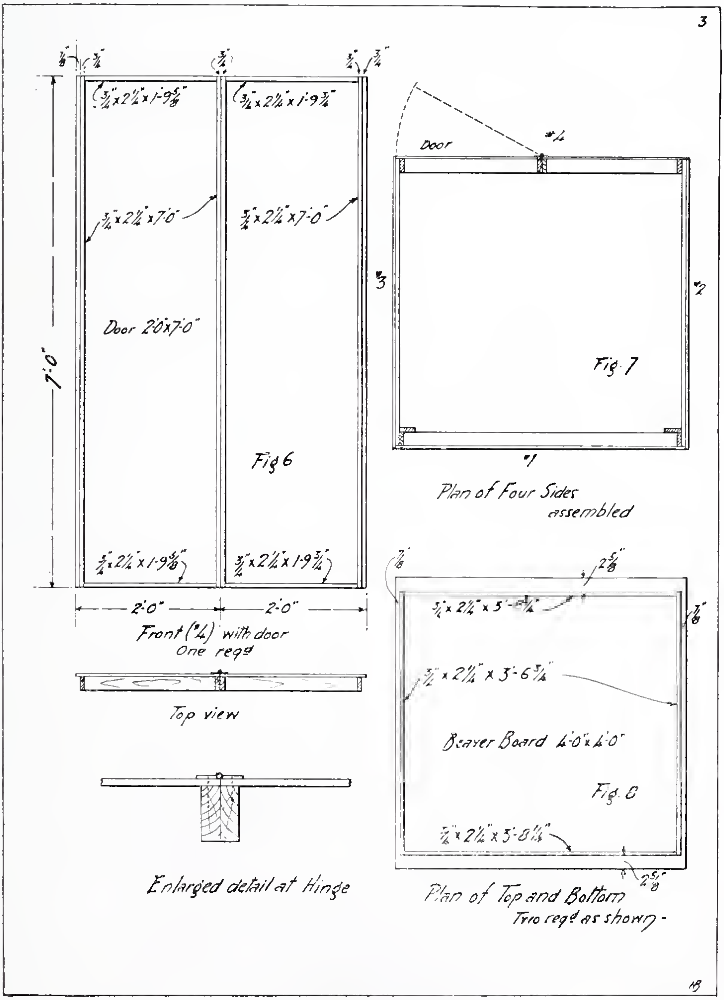
A developing-tray rack is shown, simply made of pine slats ¾" x 1" or 1½" attached as suggested. It could be placed higher than shown if thought more convenient. It is used for all developing, both for plates and bromide paper. Bromide paper is conveniently stored on the shelf shown 6" below the table-top. This can be made of beaverboard also.

Attach all sides of chamber together with screws for easy dismantling.

For enlarging, an opening the size of your camera-back is cut in the roof and a frame made to hold the camera-back snugly against it. A couple of ¾ x 2½ strips right across the top on each side of the camera-opening will be required to stiffen it and carry the camera without vibration.

An old plate-holder with the septum removed serves to hold the negative to be enlarged; and a hundred-watt tungsten arranged in a box with white paper reflector approximating a parabolic form serves as illumination. By placing the chamber near a north window and using a mirror at an angle of 45 degrees, daylight may be used.

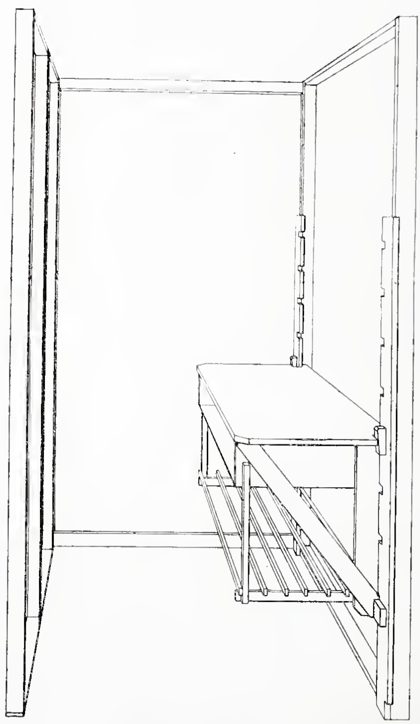
A safe light is most conveniently supplied by a ruby bulb, operated from battery or from house current; or an opening cut in the side of chamber and fitted with a safe-light will answer. Above all, do not paint the inside of the chamber *black*.



Figures 6, 7 and 8.

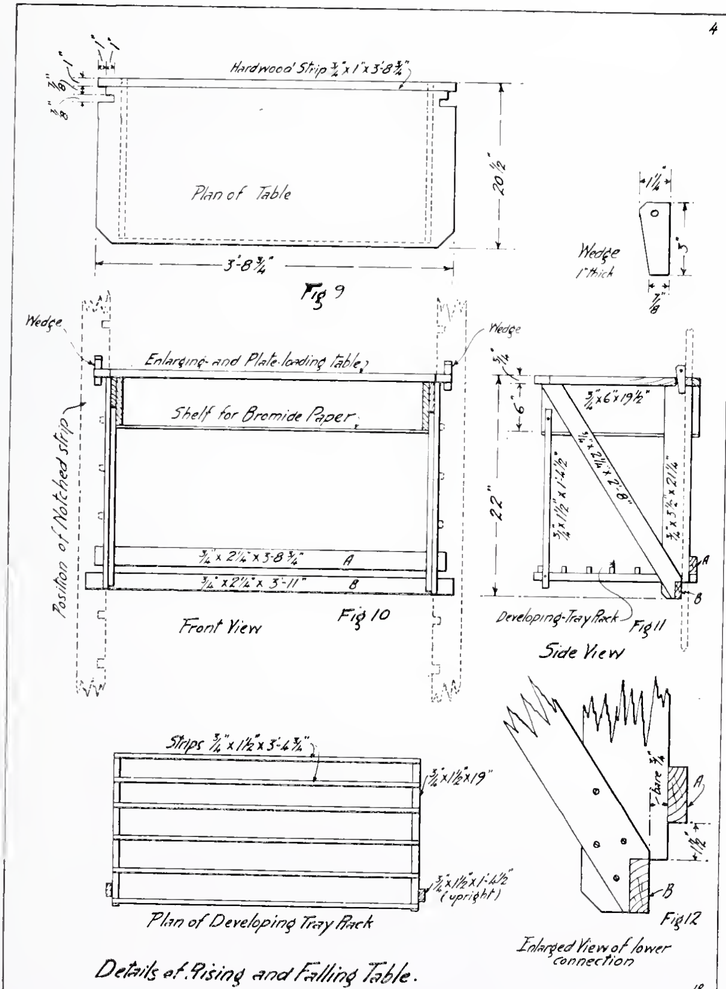
Illustrating article "A Combined Dark-Room and Enlarging Chamber," by H. E. Balfour.

In a black chamber it is necessary to place the light close to the plate, dazzling the eyes and fogging the sensitive emulsion. If the walls are grey or white, the light can be placed *behind* you, giving you a fine soft reflected light, perfectly safe and very restful to the eyes. In enlarging it will be necessary to use a screen to cut out the rays from the lens that might otherwise strike the wall near the bromide paper, and fog it. Your own ingenuity will supply you with the idea in this case.



Perspective Sketch of interior with side #3 removed.

Illustrating article "A Combined Dark-Room and Enlarging Chamber," by H. E. Balfour.



Figures 9, 10, 11 and 12.

Illustrating article "A Combined Dark-Room and Enlarging Chamber," by H. E. Balfour.

MY PHOTOGRAPHIC EXPERIMENTS AND RESULTS

By JOHN LEWISOHN

IN last year's 1917 *Annual* I drew on my imagination as to the way real color photography might be obtained; in the following lines I will come back to the cold facts of reality and describe some of my experiments with photographic prints, monotones and in colors.

Blueprints

If a finished blueprint from a negative is treated with water containing a small quantity of ammoniac, it will, as is well known, assume a purple color. If the ammonia water is now poured off into another tray, and fresh water containing a few drops of ferric chloride or ferrous sulphate flowed onto the blueprint and then the tray with the contents slightly shaken, the original blue color of the blueprint is restored. The ferric solution is now poured off into a third tray. Now the ammonia solution is poured over the blueprint again, with the same results as at the beginning and then after decanting the ferric solution again, and this is done alternately as many times as desired.

The result is that a coating of yellow oxide of iron will permeate the whole blueprint after a while so that where the blue of the blueprint is, a green picture will result on a yellow ground. The difference of using one or the other iron solution is, that if ferric chloride is used, the yellow will be darker and also the resultant green, while with ferrous sulphate a very light green can be obtained, each according to the desired result.

Mercury Iodide Prints

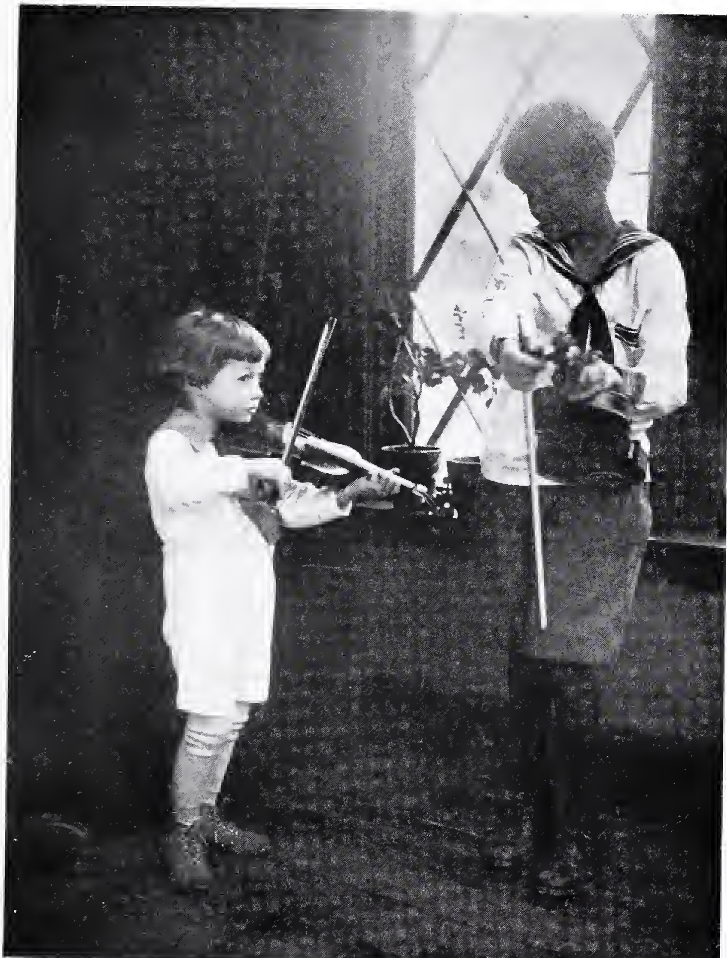
A negative silver print in black and white, for instance on gaslight paper, is covered with a weak solution of ferric chloride with a few drops of potassium iodide added. This will make the solution dark yellow to brown and producing

THE SILENT EVENING HOUR. JOHN E. BOULTENHOUSE.

in sunshine preferably for from one hour to one-half or one day or more if necessary, until the high lights turn white (the time of exposure is reduced if the sensitized paper is used quite some time after sensitizing, say from twelve to twenty-four hours or thereafter). The light reduces the ferric chloride to ferrous chloride. The print is then developed in a pyrogallic acid solution, fresh and fairly strong, and as soon as the positive picture appears the developing solution is poured off immediately and the print is washed in several changes of water until the water is not tinted grayish any more so that the superfluous pyro is removed as well as any and all of the original ferric sensitizing salts. The resultant finished positive iron print should then be a clear black and white fac-simile of the original positive transparency.

Should the print have been over-developed it can be cleared by putting a few drops of hydrochloric or sulphuric acid into the wash water. If the amount of hydrochloric acid is somewhat increased the black picture will turn brown. This will also occur if instead of the hydrochloric acid ammonia is added to the wash water. Iron prints show perfect and much better color values than silver prints. Of course if the iron salts could be made as sensitive as the silver salts so that they could be used for photographic plates also, that would be the acme of perfection, in photography especially, as even photographic plates would not be necessary because, the iron salts giving positive pictures, direct positives on paper could be produced in the camera.

If a paper with a good gelatine coating is used and sensitized with ferric chloride, printed and developed, for quite a while, the gelatine is softened where the high lights have reduced the ferric chloride to ferrous chloride and dissolved in ammonia water or it can be removed in those parts with a soft brush when in the solution, which however must be done very lightly and carefully, so as not to affect the other parts (warm water may be helpful). This will result in a very contrasty picture showing up the high lights white and dull, while the shadows will appear dark and glossy from the remaining gelatine. Instead of a plain gelatinized paper for sensitizing with ferric chloride, a gelatinized silver emulsion paper can also be used, such as for example solio paper, which



THE SECOND VIOLIN. HELEN W. COOKE.

when printed on and developed will also yield a positive picture from a positive transparency and the gelatine in the high lights can also be removed as above. Whether these pictures are iron or silver pictures is problematical.

Another mode of treating the gelatinized iron print after development, which makes the high lights soft and soluble, while the shadows remain hard and insoluble, is to dust some material in powder form on it, such as white chalk or talcum, in order to emphasize the high lights and give a peculiar contrasty rough effect in those high lights, or gold, copper or aluminum powder may be employed instead, such as is used for the respective paints, or any other powdered material desired.

Finally, instead of developing the ferric chloride print with pyro, it can be treated directly with a solution of ferrocyanide of potassium, which will produce a blue negative from the positive undeveloped print, and if then treated with pyro solution, containing a little ammonia, the blue will disappear and the regular iron print will appear.

Contact Blueprints and Silver-salted Prints

If a blueprint after printing and before development in water is squeegeed on a wet silver-salted paper and then separated therefrom under water, the blueprint will appear developed and also the same picture will show on the silver paper, that is if a positive or a negative both pictures will be positive or negative respectively. The chemical action is that the blueprint sensitized paper acts only on those parts of the silver paper where the light has converted the potassium ferrocyanide into potassium ferricyanide, which reduces the silver haloid and produces the reduced silver picture while at the same time the blueprint is being formed.

Silver Prints in Natural Colors

The picture is obtained on P. O. P. by only printing a positive from a positive colored transparency, without any developing agent at all in the following manner: A piece of solio paper for instance which will give very good results, or collodion paper is printed on under a colored transparency, such as a colored lantern slide or a colored Decalcomanie for perhaps twenty-four hours in daylight—somewhat more or less

THE PINE WOOD. James E. Paton.

does not matter, the time must be left to the judgment of the operator by looking at the print every now and then when in the printing frame and by his experience in obtaining the final picture. When the print is taken from the printing frame it is of course a very strong negative, graded according to the different degrees of light filtered through the different colors of the transparency according to their filtering values of light, that is where no color or blue, there the picture is darkest, while where red, it remains light, etc. This negative print is now printed under a plain glass in a printing frame, without any transparency, and the whites will now turn dark while the dark parts will turn darker (or perhaps lighter, that is more silvery) according to the degree of density. This will only take some minutes and the printing can be observed continually until the desired effect is obtained, that is: a picture with the same colors as the original transparency will be the result—a picture in its natural colors.

These colored positive prints prove, in my judgment, that the end of real color-photography must be based on a reversed negative, but not as now with artificial color material, but with only the actual silver salt; or on a positive picture printed from a positive colored transparency; or finally, if sensitive enough, on a positive directly produced in the camera from the original colored object.

RHONE GLACIER, SWITZERLAND. W. T. HIGBEE.

SNOW AND SHADOWS. CHARLES W. DOUTT.

FIGURES OUT OF DOORS

By ROY HARRISON DANFORTH

OUT of doors human subjects serve the photographer in one of three ways: they are there to have their pictures taken, or to tell a story, or to assist in the development of the scene pictorially. His task in the first instance is the making of a portrait; in the second, the making of a genre picture; in the third, the making of a landscape. In the first two cases he cannot get along without the figures. In the third, his first business is to inquire whether he can get along without them or not. There are certain landscapes which will not tolerate their introduction. They cannot heighten the impressiveness of a picture which is dominated by awe, or the majesty of nature or elemental force. They are difficult in

OLD ART BUILDING, WORLD'S COLUMBIAN EXPOSITION. O. J. VOLKMAN.

many instances to harmonize with natural surroundings. On the other hand, numerous emotional qualities may be added to the picture in which they are employed; the human element affords the "heart interest" that is lacking in pure "scenery." In a technical way they are of value as lines and masses in giving just the variety of direction or tone or position that is needed.

To take up our three out-of-door uses of human figures seriatim, it is of value to the young photographer to remember that the necessities of indoor portraiture extend, for the most part, to the out of doors as well. There are hands to be hidden or revealed, drapery to be arranged, fat chins to be tilted up and too slender throats to be kept in the shadow. The lighting, while not so simple of control as within doors, is of far more pleasing breadth, so long as we take the simple precaution of making our outdoor portraits in the shade. For such purposes the simpler the background the better, choosing always natural growths in preference to walls of buildings.

Genre subjects are those that can be made to "tell a story." Many of the portraits we make of friends out of doors are, unwittingly, genre; incidentally, they are often better genre than they are portraits. The having of a theme worth making a picture about is the primary excuse for this kind of picture. Fitness thereto must govern our choice of models, their arrangement and their costuming. Considerable definition is usually demanded in genre pictures; in fact, with most pictures that include the human figure.

The finding of persons able and willing to pose for genre pictures, or in landscapes, is not an easy task as a rule. The urban dweller who has professional models at his hand is fortunately situated. Others will have to depend upon friends, remembering to subdue their probably exaggerated zeal, or train such models as they can otherwise find. Many genre pictures will be taken of subjects caught on the instant; such, for instance, as one finds about shops or along the wharves or even in the streets.

The one exception to sharp definition is in the picturing of nudes, which usually fall within the genre classification. The use of nude figures is probably the last thing the photographer should undertake, because absolute perfection of technique and

THE FISHERMAN. SIDNEY V. WEBB.

the most ripened artistic judgment are needed to make such work either unobjectionable, effective or beautiful. There is a distinction between the nude and the naked, between the presentment of an artistic nude amid natural surroundings, and the picture of an undressed person outdoors. The model for such work must be draped around with poetry and imagination and sentiment or the picture fails. Indeed, it runs the danger of becoming positively abhorrent. Hence, more or less diffusion is always acceptable. The substitution of the veiled figure for the absolutely nude becomes often advisable; the treatment of the figure emotionally and ideally rather than literally, continually demanded.

Deprived of the customary restraint of clothing and the idea of its protection, the average person is rarely able to move or be passive naturally. Moreover, the approximately perfect figure is seldom to be found. The painter corrects the imperfections; the camera lens is deadly accurate. The nude picture cannot, then, from the practicable standpoint be a sheer index of facts. In practice it will be found that one line of the figure is usually better than others; that the imperfect lines can be hidden by posing and natural covering and by shadow; that keeping the figure well back in the picture space softens many defects and that diffusion covers a multitude of sins.

The use of the human figure as an item among others in the landscape, if such use is to be made properly, introduces us to the need of knowing something about composition rules, about balance and unity and the law of single dominance. To begin with the last, accepted principles forbid our having two items of equal interest in one picture. Hence, there can be no competition between the figure and other portions of the picture; either the one must dominate or the other, and if two or more figures are used, one must unquestionably be the superior in placement or accent of light or thematic interest. Offenses against unity are common among early ventures of this sort, for it is as simple to stand a person in a natural setting as it is difficult to make him fit there. Our picture must have one thing to say and must say it directly and forcefully, and the placing of figures must be attended by a continuing unified concept of what the whole thing is about. The principle of balance is most easily expressed by saying that no corner and neither side of the picture must appear to be falling down. This it will do, for instance, if our object of chief interest is well away from the middle and nothing on the other side lends a balancing pull. The larger the main item is and the more distant from the center, the larger or more distant from the center on the other side must be the compensating accent.

When we have learned thus to place one figure correctly in the picture, the placing of two or more figures becomes largely a matter of grouping. In a group, as in the picture as a whole, there must be a dominant, there must be variety and there must be unity. The last is not to be achieved, for instance, by having all the subjects look one way—as at the lens!—but they must apparently be about a similar business. With two figures especially the domination of one must be apparent. With three figures the difficulties are usually most easily solved by permitting two partially to coalesce and opposing the third in a varied attitude or tone. With a number of figures tonal excellence is usually most easily reached by placing the lighter garbed figures toward the center. If breadth and openness are desired most of the figures will be grouped close to the heaviest natural masses in the picture.

The making of any outdoor picture that includes human subjects requires an infinity of patience and tact. Numerous trials must be necessary and numerous spoiled plates unavoidable before one gets just what is sought. When that is secured it will depend for its value more on the clearness, the imaginative wealth and the power of the original conception than upon the merely technical treatment.

PHOTOGRAPHY—THEN AND NOW

By JESSIE ROBINSON BISBEE

THE old photograph album—don't you remember it? When you were a child it lay on the center table, or perhaps it had a place of honor in the old black walnut secretary. And the edges of its thick, heavy leaves were of gilt, and its cover was of red plush which felt fuzzy in a stiff sort of way to your caressing fingers. For your fingers were caressing and careful and clean! They were certainly all this if you were looking at the photographs in "the album" for in those days (at least unless you are now quite young) a photograph was a thing to admire and preserve.

It was before the time of the kodak with its "Press the button and we'll do the rest" slogan. Not a trivial thing was a picture then. Carefully it was planned for, and oh, so anxiously it was posed for, and very fondly it was hoped for, and the results—why they were never questioned—they were merely accepted and paid for! And in that day most every photographer, even he of the humble travelling car, was referred to as "the artist."

We smile as we remember the old family groups, some of them stiff and inappropriate, some of them a bit faded and dim with the years, but close to every smile there lurks a tear, for "the touch of a vanished hand and the sound of a voice that is still" comes vividly before us with the memory.

The old, old photograph album with its cabinet, its half-cabinet and its quarter-cabinet openings—we can see it yet. This yellowing picture in one of the half-size spaces, it was made at the close of the Civil War—he was young then, so young, that after four years of battle and hardship, the boyishness still overshadowed the firmness. And this picture, its companion-piece—she was young then, too, and slender, and her hair was brown and her dress was neat in the trim fashion of the day.

SIMPLICITY. Wm. Shewell Ellis.

And the tin-types, small portraits of a patient people, a bit of the record of a generation which is no more! And the daguerreotypes deeply set in their quaint double cases with their cunning little brass hinges and thin little clasps and hooks! Each so precious, because of association, that the thick, black cases were wrapped in fine cloth and kept with the treasures of the household.

And all this—what was it? It was photography in its infancy, at least photography still in its creeping days. How great is the contrast between photography then and photography now every hour of every day emphasizes. Down the street comes a merry crowd and there swing several kodaks. They have "snapped" roll after roll; they have "taken" everything from the home run to the bleachers; they have made pictures of themselves in dozens of foolish poses and they are hurrying straight to the nearest "finisher."

Next door is a camping party home from the vacation outing. They have forty-seven rolls of film; so many pictures they have made that they cannot recognize when or where some of them were exposed. They have "snapped" them, that's all; and tomorrow, as they dally with cool and sparkling glasses before a $4000 soda-fountain, they will calmly hand the forty-seven rolls to one of the clerks with the request to "print ten each of everything that's good"—"or, just a minute —Gladys, do you want a separate set? Oh, all right; just make twelve each clear through. How soon can we have them? Not till tomorrow morning? Well, what do you know about that? Why, we wanted to see them this evening *sure!*"

Oh, photograph album, silent sign of a day that is past, where are you now? You are no longer on the center table for the center table has become a library table. You are no longer in the old black walnut secretary for we have sectional book-cases instead. And the old-time respect for photography with just a little awe concerning its mystery, where is it now? It has been flattened and obliterated by the steady, steady click —click—click of hundreds of miles of kodak film. It has been smothered by the millions of amateur prints of every scale of beauty and ugliness, of every degree of sense and silliness.

Most any modern family has enough amateur photographs to re-paper the dining-room and the young people of the average, fairly well-to-do home have a kodak, or even kodaks, unless they have dropped one too many in the lake or have really seriously harmed one in propping up the window with it. Every city has its "photo-finishing" plants with their day and night shifts, with their show-case announcements reading something like this: "We develop film free—why pay?" Even at the hotel, as you register, your eye catches a sign: "Leave your film here any time before six o'clock; it will be finished when you wake in the morning." What does this mean? It is only one phase of photography now, the great-great-great-great grand-child of photography then.

But, of course, there are still professional photographers We, as well as the public, had almost over-looked them. There are men who have entered photography with high ideals of art, with splendid hopes of achievement. What is their future? The best will survive, of course, for a certain percentage of the people everywhere will want photographic portraits, the best they can have within their means to secure. But the click-click-click of the kodak should mean something to even the professional photographer of the highest standing. It should present the question—Where is its charm? And surely one of the answers would be this: the action, the at-home look, the informality of the pictures.

It is a little hard, of course, for the professional photographer to make a negative of a child, which, even before the plate has reached the hypo, he feels sure is good enough to go to the convention, and the next day be expected to become enthusiastic over an amateur print of the same child watering the lawn or drinking out of the hose! And it is equally hard for him to believe that the snapshot of the baby taken in a five-pound lard pail is the best picture ever made of it, even though he worked so earnestly and faithfully himself over a number of negatives of this baby.

But while he can not agree with these absurd ideas, he can certainly read their warning. It is this: the old-time photography is gone. The new professional photography, if it is to really please and hold the people, must get the at-home look, the informality of pose and the naturalness of expression that the old-time photograph album, no, that even the picture of five years ago does not show.

RUDOLF EICKEMEYER'S HOME

BY THE EDITOR

THOSE who love to tread the forest's ample rounds are prone to bring back souvenirs of their outings, and no home is altogether free from these treasures which recall the joys of nature we long to return to for photographs, for rest and for recreation. We had occasion to call on Mr. Eickemeyer, who is one of our first medalists of the Royal Photographic Society and member of the Linked Ring, and we are reproducing one of the rooms in his unique though simple abode which we thought would most interest our readers, for it breathes of nature's primitiveness and has been designated by a leading authority "one of the very few examples of interior decoration in this country which is distinctly American."

It was in 1885 that Mr. Eickemeyer visited a friend of his schoolboy days who in search of health had located a land claim in Colorado, and was living in a cabin which he had built with his own hands on the north fork of the Platte River at the foot of the Rocky Mountains, which in that altitude are covered with perpetual snow.

Here the two friends lived a nomadic life, contented, realizing that happiness consists in having few wants and being able to satisfy them. Picturesque, wild and unspoiled the surroundings certainly were, and so unafraid the prairie inhabitants that 200 antelope were one day counted peacefully grazing before the very door of the ranch.

It was in this simple, homelike setting that the room shown had its birth, and in order that the recollections of those happy days should remain green even in the activity of his professional career Mr. Eickemeyer when he built his house had but one really fixed idea in regard to its interior, to duplicate the cabin on the Platte, which would house his trophies of the rugged, snowy peaks and great plains, and his old furniture, precious through long association.

From the day of its completion the ranch room has been a favorite to which everybody returns loath to leave it, for it breathes the spirit of the primeval forest, there is no doubt of that, the very logs still retaining through the years their woody odor of the chestnut.

Mr. Eickemeyer tells of a friend who at the time was building an Italian villa and with his young son spent an evening in the ranch room.

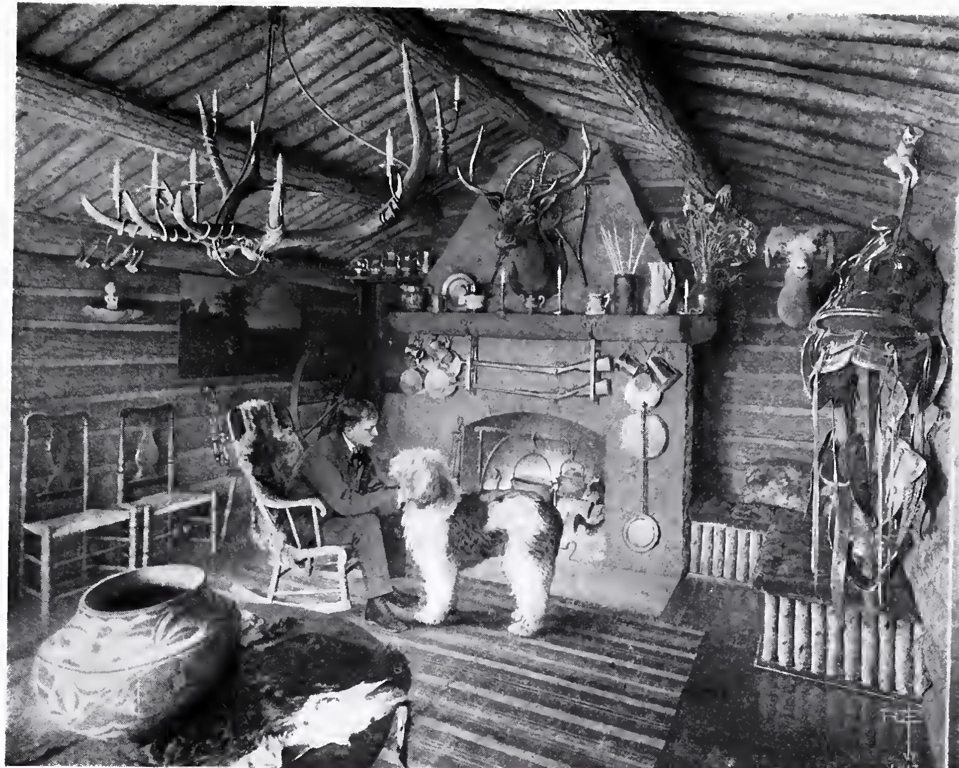
Shortly after the visit the friend's voice was heard over the telephone:

"You have gotten me into a nice scrape," it said. "Bob has given me no peace since we called, and I have promised to build a den for him like yours, in the new house."

Mr. Eickemeyer gave the architect every facility, and Bob was soon enrolled among those of us who are trying to incorporate a little of the joys found in the woods and fields into their lives and to demonstrate that even in the rush of our present-day complex existence we can achieve not a little peace and rest for our eyes by freeing ourselves from the meaningless accumulations with which our homes are too frequently littered.

One of the classics of American literature was written in a shack built by Thoreau himself on Walden Pond. He was the pioneer of the "simple life"—a term hackneyed but difficult to replace by any other appellation—and like many philosophers he was an extremist. But one cannot read "Walden" without a feeling of disgust for the artificiality and the insincerity in the furnishings of the average home of today.

It is a pleasure to see that photography, simple, direct, never pretending to be anything but what it is, is taking a place on our walls, demonstrating that these spaces can be adorned without offending the canons of good taste, and in their appeal to all that is beautiful bring us to a better understanding of the joy that may be ours in acquiring a genuine love for nature and art.



THE RANCH ROOM IN HIS HOME. BY RUDOLF EICKEMEYER.

WILD BIRD AND NEST PHOTOGRAPHY

By HARRY G. PHISTER

WE are living in an age of specialization. One can hardly expect to become proficient in all lines of endeavor; especially is this true of photography.

The amateur soon tires of making landscapes or of standing his friends in a row in front of a clapboarded house and producing the snapshot monstrosities which one sees in every beginner's album. His interest soon wanes and the camera is finally laid away, perhaps for good or else taken out occasionally when he has a vacation. The trouble is he does not specialize—tries to do everything and does nothing well.

One of the most delightful branches of photography is the photographing of wild birds, their nests and young. Besides being highly educational it brings one into intimate touch with nature and opens up beauties in the bird world which one never dreamed existed until he goes out into the woods and fields and along the creeks with field glass and camera in search of subjects.

Having specialized in this branch of photography for a number of years, I can say that instead of growing tired of it it becomes more interesting each year.

The amateur with only a short bellows roll film camera to work with is at a decided disadvantage in this class of work, as it is essential to do the focussing on the ground-glass; and it is also necessary to have a long bellows extension so that one can get close to the subject and thus produce a good-sized image. Of course, a film camera can be used by using one of the supplementary portrait lenses, and by making very careful measurements of the distance between the subject and camera, but it is unhandy to say the least.

A tripod is another essential, for in photographing nests a very long exposure is necessary as a small stop must be used to bring all planes into sharp focus.

MY JEWEL.

ERNEST J. FRANKLIN.

Another necessary adjunct to the outfit is a ball and socket tripod head. It is almost impossible to photograph most nests without one—but do not make the mistake of placing the camera directly over the nest. Place it as far to one side as possible without having the side of the nest hide any of the eggs. This gives a pleasing perspective to the photograph instead of a map of the nest, which is the result produced by placing the camera directly over it.

NEST AND EGGS OF RED-WINGED BLACKBIRD.

It is quite easy to photograph the winter birds by providing feeding places for them. A shelf nailed outside of the window, on which is placed suet and crumbs, will attract them immediately, and they can be photographed through the window, although for best results the camera should be outside so that the best lighted side of the subject is taken. In taking them through the window one sees only the shadow side, therefore the detail will not show up as well.

THE NINE MUSES. Edgar A. Cohen.

Working as above described I have photographed chickadees, nuthatches and woodpeckers, both through the window and from the outside. When working outside I pin up a curtain to get behind, for while the birds are quite tame, it is easier to photograph them if one is out of sight.

Young birds make attractive subjects, and the easiest time to photograph them is just as they leave the nest before they are able to fly very far. Do not however, try to take them without someone to help you, as it is next to impossible to keep them still and manipulate the camera at the same time.

A prime requisite in this class of work is patience, and unless one has it he had better not begin, but if one will carefully follow it he will be well repaid by his increased knowledge of nature besides adding many attractive photographs to his album.

YOUNG BLUEBIRD.
Illustrating article "Wild Bird and Nest Photography," by Harry G. Phister.

ARCHITECTURAL SUBJECTS FROM THE PICTORIAL STANDPOINT

By WILLIAM S. DAVIS

MANY photographers treat architectural subjects in a mechanical manner, either because they fail to appreciate the latent possibilities for pictorial expression in such material, or owing to the idea that a matter-of-fact representation is the only thing suitable. Whatever the reasons, they may well be forgotten, and the available material studied from a fresh viewpoint—not the least of which is to get away from the impression that because a building is a structure of set form it always presents a similar aspect to the eye, for such is very far from being true.

All architectural subjects are strongly affected in their outward aspect by seemingly slight changes in the direction and quality of lighting, to say nothing of variation in the setting at different seasons of the year. Ofttimes the difference of a few moments is enough to entirely alter the play of light and shadow on a bright day, so in many instances only close observation will reveal the most striking effect. Such facts are of interest not only to those in search of material for purely pictorial ends, but to the photographer who has occasion to make studies for technical purposes. Since all good architects take into consideration the value of shadows cast by various parts of a structure in enhancing the effect of the finished building, so it is necessary to select a favorable time to adequately illustrate in a photograph the architect's aims.

Another point I would make is that many feel the only subjects worthy of serious consideration are those obviously grand, or picturesque, in themselves. Now, it is doubtless a satisfaction to have such material at hand, yet it is a fact that many of the most successful pictures have been created from what the majority of people would consider very commonplace subjects, proving that in picture-making treatment rather than material is the important element.

THE WASHINGTON ARCH AND FIFTH AVENUE, NEW YORK.

Illustrating article "Architectural Subjects from the Pictorial Standpoint," by William S. Davis.

While it may be impossible to prove by mathematical demonstration that a part is greater than the whole, there is no question but what this is often so from a pictorial point of view, and the photographer's task in composition is one not only of selecting a desirable standpoint, but also determining just how much material should be included within the picture-space. Often there is difficulty in finding a viewpoint that will show the whole of a building in a satisfactory manner, or uneven architectural quality may make certain parts far more attractive than the ensemble, while another important element is that of leaving something to the imagination.

If the surroundings are pleasing it is well to show enough to indicate their character, for a well-placed structure is essentially a part of its environment. A curving path may lead the eye into the composition, or a mass of foliage furnish an effective tonal accent, while some drooping branches can sometimes be used to good purpose in hiding an ugly detail.

It is very difficult to give helpful advice about utilizing those intangible, but nevertheless keenly felt, conditions which invest inanimate objects with a special quality at certain times, because every subject presents a more or less individual problem. Some towers, or buildings possessing especially attractive sky-lines, are best shown in graceful masses against a sunset sky, or else rising phantom-like through a mantle of mist. Again, a building fronting upon a smooth, characterless, pavement may be given a touch of the unusual if photographed on a wet day—thus taking advantage of reflections to relieve the empty foreground. As an indication of the features which call for thought one may note the difference between shadows cast upon a vertical and horizontal surface, respectively—noonday lighting (commonly considered unsuitable for pictorial requirements) often producing the most striking shadows upon a façade, or other ornamented vertical surface.

Quality, as well as direction, of lighting is an important factor. A subject inclined toward flatness is generally rendered best by taking full advantage of clear strong sunshine, the little variations in surface texture and shadows cast by delicate details being emphasized most when the light falls obliquely across the surface photographed from a position somewhat in front of the observer. An over-decorated struc-

THE SOUTH PORCH, GRACE CHURCH, NEW YORK.

Illustrating article "Architectural Subjects from the Pictorial Standpoint," by William S. Davis.

ture, or one having deeply recessed portions, appears best as a rule upon a hazy or cloudy day when the diffusion of lighting softens the scale of contrasts.

On the technical side the following suggestions can be followed advantageously:

Avoid, so far as possible, the use of wide-angle lenses, since violent perspective comes from too near a viewpoint. If the latter is unavoidable, try to lessen the depth of perspective by taking the subject at a slight angle rather than by looking along the edge of a wall or long corridor.

Always employ color-sensitive emulsions, for one usually runs up against combinations of different colors, either in a building or its surroundings, which cannot be properly represented otherwise. Of choice, plates should be either double-coated, or backed, to guard against halation.

A ray-filter is invaluable in many instances, as, for example, to bring out the veinings and gradation in toned marble, or to preserve the tonal balance between white in sunshine against a blue sky.

There is a happy medium in focusing, best suited to architectural subjects, which lies between biting sharpness on one hand and woolliness upon the other. Between these extremes it is possible to secure a quality of definition giving atmospheric quality and still preserve the essential surface textures, which are an important feature in the subjects under consideration.

The length of exposure is mainly determined by the range of contrast present—full timing being essential to give transparent shadows with delicately graded lights, for all details in the former should appear in developing before the lighter tones of the subject become over-dense in the negative.

A WET MORNING.

Illustrating article "Architectural Subjects from the Pictorial Standpoint," by William S. Davis.

LEAVES FROM MY NOTEBOOK

By MARCUS G. LOVELACE of the Lovelace Research Laboratory

I HAPPENED to run into a circumstance the other day that was the origin of this article, through over-hearing a conversation between a certain dealer and a customer. The customer had bought a very excellent anastigmat of 4/5 aperture, and was complaining bitterly over the results. I may say (en passant) that it is probably the most popular lens of this aperture in this country to-day. He had been in the habit of using a 6/3 lens of enemy manufacture and was trying to convince the dealer that the 4/5 lens would not give the crisp brilliant negatives that could be obtained with the 6/3. I happened to be seen by the dealer and was called over. I suggested that if the 4/5 lens were stopped to 6/3 the results would be the same, which met with an indignant denial from the owner of the lens in question. I was then shown negatives and prints illustrating the difference, and while the depth of focus was slightly different in the two cases, owing to difference in focal length, the appearance of the two prints was not the same. The 4/5 looked woolly and rough, and to tell the truth the real difficulty was not as easily found as might be thought. On my suggestion, the lens was sent back to the makers and carefully tested on a chart, and found to be O. K.

The affair remained a puzzle until the owner of the instrument in question found that the whole trouble was in the fact that he wore eye-glasses. When using the 6/3 lens the depth of focus was sufficient to allow him to keep his eyes at a little distance from the hood of his camera. Did I forget to say he had been using these lenses on a reflex, but when using the other lens he could not get his eyes close enough to the ground glass to allow of critical focusing at a large aperture?

M. FREY.

The difficulty was gotten over by lenses fitted into the hood of the camera and the lens question was solved.

Now the point of all this. This gentleman, whom I will call Mr. X. to save time, at various times while he was writing long letters to the makers of the lens and having animated discussions with every one who knew spherical aberration from Potts Disease, used to dig out articles from the May, 1912, issue of the "United States Kodak" and the "American Amateur" and the little trade magazine "The Film Wasters Monthly" and break forth upon an astonished world with statements that remind me of old Sam Prendergrass and the traveller.

Old Sam was an old worthy whom I knew in Orégon many years ago, who had a very disconcerting habit of listening until all direct conversation on any subject had ceased and then making some very terse remark that always punctured any bubbles that had been blown. He was listening to a chap who had travelled in Alaska relate his experiences, and when one particularly wonderful tale was finished and the Oh's and Ah's had died away, someone said, "Well, Sam, what about it?" The old fellow took his pipe out of his mouth, and said, "Wonderful—if true."

Mr. X showed me articles on lenses by Mr. Poldoody who knew all about lenses, having cleaned his own twice. Then he showed me an article by Mr. Fusticus on how to use a rising and falling front on a kodak. Mr. Fusticus is going to write us another article some day on how to use a sliding front on a kodak, as well as a swing back, with an appendix telling how to make 24-karat gold from bituminous coal. There were articles on lenses by the mile—pitiful re-hashes of elementary principles that have been told in every annual, British and American, for so many years that why waste space.

Now the conclusion reached:—In my opinion all this fog about optics, and chemistry, that produces the articles by Poldoody, Fusticus & Co. in our literature can be easily cleared up. Recollect, my dear brothers, these chaps do not *know* anything about these subjects or they would not write these articles. Take one of them to any teacher of physics, or to any man who can write Bachelor of Science after his name and ask him, and you'll get a surprise. You'll be told that the

THE SUNBEAM. ALFRED B. CASE.

author did not know what he was talking about, when he tells of giving a practical test to a lens, to determine its performance.

I have more apparatus for this purpose than the average amateur (or professional) ever saw, and have been trained in this work, and I can assure any of my readers that there is only one kind of a test for a lens—that is one made with proper instruments by a skilled operator of experience—any other test is not worth making for it tells you nothing. I see lovely little diagrams of shutter testers in the magazines every little while—the errors of such machines will probably not be more than 100%—in fact after trying one, you will be nearly as well off as if you had shaken dice about it.

The layman does not realize the difficulties that obtrude themselves in a matter which seems as simple as this. In the first place any of the methods of shutter testing in current use, such as the Wynne Tester, the falling ball, the pendulum, etc., do not show the effective aperture of a shutter from start of opening to last point closed. They simply show what time elapses from the time the first effective beam of light passes through the shutter until the last effective one has been cut off. Naturally this type will give faster readings in poor light, or with slower plates. Conversely it will give slower readings in bright light or with fast plates, for there will be a longer record made owing to the light being strong enough to make a registration even when the shutter is practically closed. How long the shutter requires to open—how long it is wide open—and how long it takes to close—all these facts compared with the total time of operation from start to finish, these things will really tell what the shutter does.

The Abney and the new Eastman shutter testers are almost the only ones that show these things—the Eastman being an improvement on the Abney, by getting the intermittent beam in a different way. Either of these machines might be built by anyone who had a machine shop, money, and a technical education, or in lieu of that sufficient income to buy knowledge, machine work, and training.

If you have doubts of your shutter (and if you have not, be happy—know nothing, fear nothing) don't play with it and these little tricks of testers, get it tested properly and know

OCTOBER MORN.

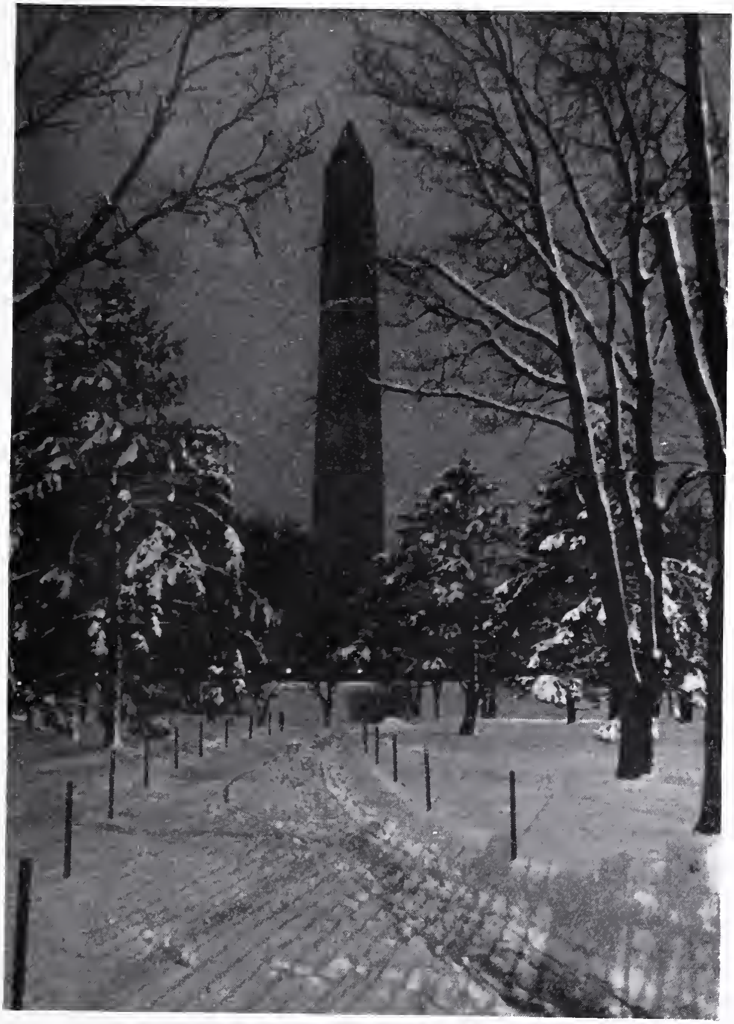
LAWRENCE BAKER.

what it does. I venture the statement that there is not a man who has written about falling balls, pendulums, etc., for testing that can get results that are within 300 per cent of the actual readings.

The makers of the shutter ought to be able to tell you—they will if you go after them properly. Do you know that the largest shutter makers in this country made the statement a year or so ago, "We realize that the markings on our shutters bear no relation to the actual speeds, but as long as the public demands 1/100 on a cheap shutter, and will only buy shutters that have it, we must continue to mark them in this way. As soon as the public realizes that the speed marked on shutters are only figures that really mean nothing, from the fact that they are not within 100% of the truth, we will be glad to substitute a system of marking that will indicate the actual performance of the shutter." I had hoped this year to have ready a series of plates showing the performances of various well known shutters, but it has been impossible to finish them in time, but they are a surprise.

Not a surprise in the way that a friend of mine got a surprise. He bought an Extreme High Speed shutter, one that climbs up around 1/1500—a lens shutter—put it on, went out in bright sunlight and took a picture of a chap turning a back somersault and only got back about ten feet. He was used to shooting a reflex and as soon as the athlete started over he blazed away with the camera, trusting that the shutter-lag would give the jumper time to get up to a point where he turned and where there would be less motion. Naturally the lens shutter, which he had only wound to 1/600 and that only ten feet away, with the athlete going at greatest speed as he left the ground, did not stop motion by any means. He went around grinding his teeth until he got a letter from the makers reminding him of what he had done. In the meantime he wrote a letter to the "Ambrotype Age" and in the next issue it appeared in full glory. Had he kept still about it, no one would have ever known how ignorant he was, but he published his shame broadcast.

After the diagnosis comes the remedy. If you have a camera and don't want to know anything about it, theoretically, very well. But don't for the sake of suffering humanity write arti-



THE WASHINGTON MONUMENT
ON A WINTER'S NIGHT.

ERNEST L. CRANDALL.

cles about it to the magazines. Don't uncover your mental nakedness. If you are content to press a button do so, but do not—pray, *do not*, try to tell anyone that you can do half-tone work with your kodak. Remember what Artemus Ward said, "There is them that larf at these things, but to me they merits rebooks and frowns."

The limits of the kodak type of hand-camera are due almost entirely to the fact that it cannot be focussed. Of course, with a lens of short focal length, or reasonably small aperture, one can get so that they can guess close enough, but the use of 4/5 lenses of 5 to 6 inches length is impossible (Fusticus to the contrary, notwithstanding) and the 6/3 lens of 5 inches focus is not easy to use at short distances. Of course, you can get something but you should be able to get the type of image that can be enlarged to a reasonable size, every time.

The Eastman Company have recently put out a line of kodaks with a range-finder built in, that indicates exactly when one is in focus, which in my opinion is the greatest improvement ever made in the kodak. It is simple, and so far as I have been able to test it—perfect. It will enable the use of 4/5 lenses—with a little care, and should obviate all difficulties with regard to focus. But do not expect the kodak to do what a reflex does, for you will be disappointed, for while fine results can be had with the kodak, it is primarily a camera for the man who wants portability above all else. You sacrifice the power of composing a picture in the camera, as the finder is too small—you sacrifice the use of a speed lens as you have (without the range-finder) no way of focussing it—a scale being of little use for a lens larger than 6/3, speed pictures in the true sense are impossible on account of this lens difficulty, and the use of low speed shutters, and you have no rising front. Excuse me, you have?

I knew a man once who could *smell* what was going on on the film and he could look at an object in the finder, turn his rising front up 3/18 of a turn and get exactly what he wanted on the film—Oh, yes, he could and he knew just what he was getting. I read Baron Munchausen in my youth and got so I could believe things that were not so, "but far from it and never were" so that, naturally, I accept this statement as gospel. Anyone that can guess what happens on a film when the

PORTRAIT. Alice Boughton.

rising front is raised can make a good living inventing perpetual motion, do it easier, and not strain their reputation for veracity so much.

Personally, I would suggest to the amateur, who is not satisfied with a small, cheap kodak and wants to go up a step, that he buy one of the 3¼ x 4¼ or 4 x 5 folding type, such as the Century Folding or the Film-Plate Premos. They can be used with a scale—for guesswork, use either plate or film, and have a ground glass so that one can tell what they are doing, most of them have bellows enough to use a lens of reasonable focal length, and can be used for copying in most cases. Portability is sacrificed, of course—that is you can't put it in your pocket, but you can get pictures with it that are almost impossible with a kodak—indeed to one other than a range-finder type they are impossible.

Far be it from me to decry the efficient, convenient, neat, and attractive kodak, but it has its place, just as the repeater watch has, and no one ever thinks of buying a repeater watch to fasten on the wheel of the Ford. "The watch that made the dollar famous" is more in order for such work, and when you try to do graflex work with a kodak, you wrong both instruments. Personally my choice is the folding reflex, such as the Ensign or the Adams, as they are so compact while giving all the advantages of the large box type.

They are not a great deal larger than the film-pack camera of the same size and have the advantages of the reflecting type. If one watches the second-hand dealers, it is possible to pick a reflecting camera of sorts, at a very low figure and after you have used one for a little while, and kept track of the up-keep, it is surprising how little your pictures cost.

Mr. Kodak, you take your films and have them finished—count up all *good* pictures you get in a year, divide the cost of production by that and ask yourself if the blind camera is cheap to keep up. Possibly you finish them yourself—try the above and see what you are spending for a good negative. Of course a meter will cure your exposure troubles, and a range-finder will practically cure the others, but will not help your composition and will not give you pictures on dull days.

The reflex will do all this, your pictures in the end really costing less.

The principal difficulties with a reflex are in the lack of adequate rising and falling front and in the shutter speeds. Most of us when we first own a reflex are inclined to wind the shutter as far as it will go, narrow the slit, and fire away at top speed. After a little the advantages of the low speeds are in evidence, and the majority of experienced users of reflex cameras find the most use for speeds from 1/150 down to the low limit. There is room for improvement in most reflex cameras in the slow speeds. Very few of them have anything below a 20th second or thereabouts, while it is possible and even advisable to have speeds that are very much slower than this as the extra weight of the camera gives the desired steadiness during exposure.

Two foreign cameras have the very slow speeds—the Adams and the Newman-Sinclair. In the Adams camera the slow speeds are obtained by means of a pneumatic brake on the focal plane shutter, while the other instrument has a front shutter—geared to the setting dial and to the release so that it operates in exactly the same way that the focal plane shutter does.—that is as far as setting, focussing and exposure goes. It is open while the mirror is down, closes just before the mirror rises, and as soon as the latter reaches the top of its travel, the shutter is released. In this way, the makers have low speeds down to a retarded 3 seconds for stand work.

A great deal has been written and said regarding the relative advantages of the fixed slot in a focal plane shutter, versus the adjustable slot. The fixed slot is claimed to be more certain in action, to give a perfectly parallel slot, and to be free from curtain trouble. While it is certain in action, and gives a parallel slot, and is free from trouble to a certain extent, I do not entirely agree with the statement made by users of this shutter that it is more convenient in use and that the adjustable slot is a source of trouble. Possibly in the case of a very cheaply made and poorly designed curtain shutter, there might be trouble, due to faulty workmanship, but not to inherent faults in the design.

The better class of adjustable slot shutters are absolutely free from trouble, and in many ways are more convenient than the fixed slot. I have had two European reflex cameras in use under the most adverse conditions for the past four years.

ANTOINETTE B. HERVEY.

of two well known foreign makes, and have yet to have any trouble whatever with the shutters. Barring a few drops of fine watch oil once or twice a year, they have had absolutely no attention and have given the most perfect satisfaction. Both are the type that sets before winding, by means of the setting knob. The speeds are indicated directly on the dial, without the use of tables, there is no tension to be changed and the mechanism has (in my case at least) operated to perfection. There is this to be said anent the fixed slot instrument, such as the Pressman, Ica Popular, Graflex, and some of the cheaper types of foreign cameras, that the mechanism is so simple that in case of trouble, on a camping trip, it would probably be possible to repair or adjust same with less skill than would be required for such a shutter as the Ensign, or Thornton-Pickard, so that for an explorer there might be some advantage in the fixed slot. On the other hand, with fixed slots, there is the consultation of tables, to determine the combination of slot and tension and the resultant speed, the shifting through a number of slots, indicated on a tiny dial, the same difficulty with tensions and the result being that most users of this type change their speed as little as possible, if at work where time is precious. The charge is made by the users that the adjustable slot is not reliable, yet I seem to remember reading of Sir Ernest Shackelton taking an English-made camera with him to the Antarctic and getting results with it. The two types have their advantages, but when well made do not differ materially as far as reliability goes.

Color photography is one of the things that has been dying a slow death since the opening of the war, as the Paget plate was stopped early in the game, the Sanger-Shepherd supplies cannot be obtained owing to shortage of dyes in England, causing the government to forbid the exportation of any needed in England, and the Lumiere has practically ceased to be obtainable. The only things that can be had are the three color carbon, and the Hess-Ives process. Both of these will give beautiful results, but the amount of work required to produce the finished result with either is so much greater than with the Autochrome, that I do not believe there will be any comparison in the amount of work done—by amateurs at least—in the two types of plate.

The Hess-Ives or Hicrome has been improved until it is by far the simplest color plate of its kind that has ever been made and when one reviews the years of work and the many, many schemes that Mr. Ives has evolved to solve the problem before him, the Ives plate represents more labor than probably any other plate. In its present form there is what is called a Hiblock, consisting of two plates face to face with a film between. This group is bound together when bought, placed in a holder, and exposed in a camera as usual, the exposure being about the same as other color plates as regards to speed—any color plate being very slow, as a matter of course. This block of plates is developed in a special tank—or could be developed in tray, in complete darkness.

After the plates are developed and finished, just as in the case of any other plate, they are printed on bichromated tissue, coated on celluloid developed in hot water, and dyed up. The three images are superposed and we have a color-positive, of the type of the Sanger-Shepherd. Properly made these positives are very good. The prints on paper are made by printing from the negatives, on celluloid coated with bichromated gelatine-developed in hot water, dyed, and placed in contact with a paper coated with soft gelatine. The dyes having a greater affinity for the soft gelatine of the paper coating than for the moderately hard coating of the celluloid transfer migrate into the paper, leaving the printing plates clean, to be dyed and used again. The prints on paper give the impression of wooliness—or fuzziness. They are not crisp and sharp, owing to the manner in which they are produced, and the amateur who looks to count the hairs of Fido's tail in a color print has a large and varied surprise in store for him; on large work, say whole plate size, they should be very pleasing.

Color photography has lost another able worker in the last year in Dr. J. H. Smith of Zurich, Switzerland, the inventor of Utocolor Paper. Utocolor should be familiar enough to my readers that it is unnecessary to explain what it was and how it was used. Suffice to say that while the paper was not very difficult to use and gave very good renderings, it suffered from the fault of all the color prints that I have seen except the three-color carbon, i. e., fuzziness. As Utocolor was printed through the glass of the Autochrome, Paget, Dufay or what not, it naturally follows that it could not be made critically sharp. The paper itself was wonderful and when one thinks of the work of producing a paper, that chameleon like assumed the color of the light to which it was exposed, and that could be fixed to a reasonable degree of permanency afterwards, we can only have the greatest admiration for the steadfast work of Dr. Smith through so long a time.

The problem of color photography has a history almost like that of the aeroplane or the dirigible. Wilson's Cyclopedic Photography, for instance, is full of notes of people who "discovered" color photography, only to be proven the most arrant impostors, or at best, self-deceivers. Like the aeroplane again, it is a problem of development, the ideas that are in use today being old ones and many of the old workers were right on the trail of the solution had they but known it. The strange part of color photography, aeroplanes, and even automobiles is that they are all the work of amateurs, tinkerers, handy-men. The course of affairs after the fellow who worked nights in the woodshed had blazed the trail is another story, but the fact of the matter is that nearly all of these things were worked out by the man who did not know anything about them save what he learned as he went along.

The idea of the halftone dates back to an amateur. Fox-Talbot suggested the idea, but never did anything with it, and another amateur (in those days), Ives, perfected it. Our papers and books are full of pictures mostly in halftone, but I doubt whether there are a dozen of my readers who know that Mr. Ives made the halftone a practical proposition, as well as the Hicrome plate, and that no man living has done as much experimenting in the line of color separation. The practical method of color photography, that will put it in the kodaker's hands and make the inventor wealthy, is one that will permit of handling like a film or plate—one piece—directly developed—directly printed, like a film is printed on D. O. P. and made rapid enough and permanent enough that it will be as easily worked as Velox. It will come, some experimenter will hit what we want, and we will all wonder why we did not think of it ourselves.

I have taken up my space with many things—possibly they interested you, if not, accept my apologies for having bored

DOING HIS BIT FOR THE ALLIES. F. D. BURT.

you, but I have one or two new formulas that I think will please you. Many of us have wished to be able to coat filters of safe lights and have them dry rapidly, and without the disposition to reticulate that we sometimes find in gelatine. The following formula will solve the difficulty, I believe. It is possible that some dyes would be affected by the solvents used and of course in that case the answer is obvious. If the dye is soluble in alcohol (most of them are) I would recommend dissolving it in the alcohol directly and leaving out the component marked "Stock Solution."

Chloroform	10 cc	
Ether	50 cc	
Ethyl Alcohol..	42 cc	
Stock Sol......	15 cc	(Dye in distilled water)
Hydrogen Peroxide	15 cc	(This should be Marchand's *not* the drug store breed)

Gelatine will readily dissolve in this and it will dry hard and clear in ten minutes. If the dye is alcohol-soluble, add 15 cc of alcohol to the amount given (42 cc) and dissolve the dye directly in that. I would recommend that for formulas like this you procure your chemicals of a house that makes a business of selling chemicals to chemists, not of a drug store. You will save time and trouble in this way.

One application of this is as follows. Most of us have seen the anaglyph—the little box of pictures, with the pair of spectacles, one side having a green glass and the other eye having a red glass. The pictures are arranged to produce a stereoscopic effect, by having the picture seen by the right hand lens of the stereoscopic camera printed in red ink, and the one from the left hand lens printed in green ink—the two pictures being printed over each other. It is obvious that where both lenses see the same thing both red and green images will occupy the same place, but where the right hand lens sees more than the left, then there will be a portion of the picture (the excess seen by the right lens) in red. In the same way, anything that is seen by the left hand lens in excess of what the other sees will appear as green. Now if we look at this composite, through eyeglasses having a red glass for the right eye and a green glass for the left, we will have each eye seeing

LOST. L. O. Bogart.

just what the lens saw that occupied the same relative position and we will have a very excellent stereoscopic effect. These little boxes of pictures with the glasses are sold under the name of the "Anaglyph" and can be found at toy stores, or some of the opticians, that handle a varied line of goods. If you can get hold of a set it will simplify the making of the slides, as the principle will be apparent at once.

In order to make a stereoscopic lantern slide, naturally a stereo negative is the first requisite. There are many ways of making them even with a single lens camera, so I'll not take up space with methods.

Only a few materials are necessary. The right hand picture of the stereo negative—right side up—is printed on film. The Agfa flat films are excellent, also some of the foreign roll films. The point of the film is that the emulsion must be soluble in hot water. Sensitize with Autotype Spirit sensitizer or 5% solution of ammonium bichromate and dry in the dark. Print with the *celluloid* side of the film in contact with the emulsion of the negative. A short exposure only is necessary—two or three minutes in sunlight, and the film is then developed in hot water, like a carbon print. This must be done in very subdued light. After the image is plainly visible rinse, and fix in plain hypo.

Wash and dye in a weak solution of eosine. Ordinary red ink—stationers' red ink—is quite satisfactory and is usually at hand. Dye for a moment or two and then look at it through the *green* side of the eyeglasses, and be careful not to get it too dark. Rinsing in water will remove excess dye. Blot off with lintless blotter and dry. The other side—the left—of the stereo negative must have a positive made from it. Make it as usual on a lantern slide, develop, fix, wash and dry. Now print from this on a lantern plate sensitized with bichromate, in the same way.

The lantern plate must be prepared for printing as follows. Fix first in plain hypo—wash, dry and sensitize in bichromate, and dry in the dark. After printing place in a tray of cold water—not *hot,* but cold—for an hour, swab off and dry. Now dye in a 1% solution of pinatype green, until it answers the test of the appearance through the red side of the viewing glasses. Dry and place face to face with the dyed film, and register. This is easily done, by simply placing the film on the slide so that two objects in the foreground are on top of each other—or nearly so. Put a mask on the film, bind up with a cover glass, and it is ready for the lantern. It may be that the red glass of the spectacles is too dark. If so it is easy enough to make a viewing arrangement by coating glass with gelatine dissolved in the solvent given previously, with a little eosine for the red side and pinatype green for the green side.

Should the objects on the screen look as though things in the distance were nearer the spectator than objects in the foreground, you have printed from the negatives in the wrong order—that is the colors are reversed—the positive which should be dyed red being green and vice versa. This is the condition known as pseudoscopy. Stereoscopic projection is a great sensation and a few viewing glasses prepared, with one or two stereo slide, will be a nine days wonder to one's friends. Of course the explanation of the Anaglyph is comparatively simple—the red image appears black to the green viewing glass, and consequently the eye looking through the green glass sees the red as black. On the contrary, the red image being of the same color as the filter through which it is viewed is invisible—it appears as white to the eye looking through the red glass. If the right hand picture is red, and the left hand picture green when looked at through glass in which the right hand is green and the left red, each eye will see only one picture—the other being invisible through being the same color as the glass it is viewed through—and the result will be a true stereoscopic effect. If you can get hold of a set of the little pictures I mentioned, that are sold under that name, they will demonstrate the working of the illusion in a moment.

SHOSHONE FALLS. *Copyright by Clarence E. Bisbee.*

Figure 1.

SKUNK CABBAGE.

Illustrating article "Gunning for Wild Flowers," by Carl Krebs.

GUNNING FOR WILD FLOWERS

By CARL KREBS

YOU may sally forth on a perfect day with your camera and go gunning for wild flowers in a happy-go-lucky way and pick up the pretty things as they drift across the path of your aimless wanderings, or you may get an order from your authoress, who perhaps is writing a book on "Way-side Flowers," to get plates of certain specimens to illustrate said book. There is where your troubles begin, for wild flowers have a canny way of dodging you when you look for them, and overwhelming you with profusion when you least expect it. I have traveled per pedes apostolorum or paddled on a wheel for miles and miles to find a pretty group of the velvet plant or the Joe Pye weed, when to my utter chagrin one or the other presented itself to me a few days later within a short distance of my home.

Figure 2.

HEPATICAS.

Illustrating article "Gunning for Wild Flowers," by Carl Krebs.

Figure 3.

ORCHIDS AND FERNS.

Flower photography is said by many to require the least artistic taste and technical ability in camera work. This may apply to still life studies in a studio, but let one trace the wildlings to their lair and there work with them he will find his pursuit full of romance and adventure.

One of the humiliating and discouraging phases of this kind of outdoor work is the persistent refusal of the weather to be agreeable and accommodate itself to the days when one can get away from the everyday struggle for existence.

Then again, the majority of wild flowers are as shy as wild natives or children about having "their picture took," and will not desist from playing tag with the zephyrs long enough to get a good impression on the plate. Some of the less lively ones, on the other hand, are indifferent and will stand perfectly quiet and let you shoot at them with a small diaphragm as long as you wish. One of these is the staid and sedate skunk cabbage (Figure 1), although his home is in the muck and mud, and even though your feet may be encased in

CLARISSA HOVEY.

storm boots and your body in old clothes, you will ensue from a tussle with Mr. Spathyema in such a disreputable condition that you prefer to sneak home along the railroad track and enter your abode from the back door. Mushrooms and toadstools also lend themselves willingly as models for posing and live in a more respectable neighborhood.

Early in the spring I was working with a pretty group of Hepaticas (Figure 2), snuggled away at the base of a big tree, where they were protected from the raw March winds. Kneeling on the ground with a shortened tripod and working by the sweat of my brow under the focusing cloth I became aware of a rustling in the leaves. Throwing back the cover and searching for the cause I perceived three little garter snakes, peeking from their hole, their heads perched one above the other and eyeing me with intense interest. Mamma and Papa snake were on the outside wondering what all the fuss was about. Finally Mamma made a dash for me. Being a naturalist, I do not believe in destroying harmless life of any kind. I therefore did not look for a rock or club, but simply shooed the little snakes away and proceeded to get my negative.

Coupled with the photographic interest in this pursuit is always that of the botanist, and a day never to be forgotten was the discovery in an almost impenetrable tamarack bog of a group of the beautiful orchids (Figure 3), known as the queen's lady slipper, surrounded by their vassals, the royal ferns. Were these royal nabobs of the flowery kingdom resentful at being approached by an ordinary mortal, and did they dispatch their invisible trustees, perhaps the fairies or gnomes, to the frontier of their domains, to there punish the intruder, or was it the unlucky number of thirteen, which composed the group of these blossoms? Anyway, having made an exposure and leaving the swamp by climbing over an old rail fence I tripped and, falling to the ground, sprained my ankle, from which it took me six weeks to recover. However, I cherished the negative as worth every bit of suffering I endured.

But enough of romance, just a few words in regard to technique of flower photography outdoors. Much has been written on the subject, and I will mention only a few facts

IN THE BLUE MOUNTAINS—AUSTRALIA.

Arthur Daring.

gained by my personal experiences. As to cameras, hand cameras, even Graflex, are out of the question, as you cannot get true tone values with short exposures. A stand camera with long bellows and a lens with deep focus, such as rectilinear or symmetrical lenses, are preferable. Speed would, of course, be desirable, but an anastigmat with wide opening at the close proximity necessary to take small subjects would not even put the whole circumference of a flower in focus without stopping down, let alone the background. In order to get absolute records of nature artificial backgrounds should not be used. Natural settings of short perspective, such as the base of a tree, a fallen trunk, a mass of ferns or grasses, are very desirable and allow working with a larger diaphragm, lessening the time of exposure. Orthonon plates give beautiful color values and tone gradation. However, a long exposure and not too dense a development of the image with ordinary plates give results hard to improve.

There is a reward in gunning for wild flowers with a camera in the exhilarating influence of long hikes in search for your game, the study and knowledge of nature, and the producing of scientifically valuable and, I dare say, pretty pictures.

H. P. WEBB.

Figure 2.
Illustrating article "Summer Memories from the Maine Woods," by Arthur Hammond.

SUMMER MEMORIES FROM THE MAINE WOODS

By ARTHUR HAMMOND

THE advice usually given to those seeking enlightenment on the problems of outdoor portraiture is to avoid direct sunlight and to place the sitter in the shade of a tree or on the shady side of a building. In many ways this advice is sound and sensible and, in so far as it tends to eliminate technical difficulties, it is helpful to the inexperienced. Every rule, however, has exceptions and among amateur photographers there are some who want to know why and who are not satisfied to do as they are told without knowing why. Briefly, then, it is advisable to make portraits in the shade because, by so doing, one avoids the dangers of halation and other technical difficulties, and a soft and diffused lighting gives a more natural rendering of the features so that a por-

Figure 1.

trait taken in the shade is more likely to be a pleasing likeness.

But there are great possibilities in sunlight and very interesting results may often be secured by taking portraits in direct sunlight if a few simple precautions are observed. As my illustrations (Figures 1, 2, 3 and 4) perhaps will show, the bold and contrasty lighting of sunlight and the freakish accentuation of shadows often may possess considerable interest and charm.

We may well study the methods of the modern motion-picture producers. Often, I am sure, we have been impressed with the beauty and realism of a strongly lighted "close-up" made in blazing sunlight, and nothing can so well suggest the dazzling splendor of a summer's day. If it can be done in the "movies," why should not the same thing be done with a Kodak?

My own recollections of my annual ten weeks in camp are best preserved by pictures of the boys reveling in the glorious, health-giving sunlight of July and August in the Maine woods, in spite of the resulting inconvenience and discomfort of sunburn and blisters.

The technical difficulties that must be considered are chiefly, the importance of giving sufficient exposure to secure detail and transparency in the shadows, and then of developing slowly and carefully so that the high lights do not become too dense. It is just the old adage that has been handed down to us by the thorough and painstaking workers of the old wet plate times whose motto was—expose for the shadows and develop for the high lights. It was real hard work in those days and they knew what they were doing.

Then there is the trouble likely to be encountered by fog and flare when working *contre jour*, and a lens shade will be necessary to keep the sun from striking the lens. In this respect, lenses of the semi-achromatic type—the single lenses, not the doublets—are to be recommended because, as a rule, the single component is mounted behind the diaphragm and the hood or barrel makes a very efficient lens shade. If a permanent shade is not available, it is usually possible to shade the lens with the slide of the plate-holder or with any other opaque object that may suggest itself. And this should be done because if direct sunlight falls onto the lens while the exposure is being made, it will fog the plate or film, and the negative will be flat and lacking in sufficient contrast.

Another difficulty that may be encountered is that the bright light may cause your subject to screw up his eyes and assume an expression that is natural under the circumstances but not particularly pleasing. There is some indication of this in Figure 1, but in this particular case it is quite appropriate because Jack always half-shuts his eyes when he smiles and

Figure 3.

Illustrating article "Summer Memories from the Maine Woods," by Arthur Hammond.

his smile is permanent. I believe he smiles when he is asleep. If you can have your sitter turning away from the light, as in my other examples (Figures 2 and 4) you will avoid this difficulty.

It will be seen that in some of these examples (Figures 1 and 2) the shadows are pretty dark, even the shadows on the face, but this is quite as it should be, for, in order to show the modeling and the shape of the features, we must have shadow and in bright sunlight the shadows are comparatively dark, but they must not be empty and solid. It is very important, therefore, to be sure to give sufficient exposure to secure detail and luminosity in the shadows. A fully exposed and slightly under developed negative will usually give a better and truer rendering of sunlight than the under-exposed and over-developed "soot and whitewash" pictures (as they call them in England) with solid black shadows and white paper high lights. These snaps of mine had 1/50th of a second at F/6.3 with a focal plane shutter and were made on film packs and on Inst. Iso. plates, both of which have the same speed factor.

Figure 4.
Illustrating article "Summer Memories from the Maine Woods," by Arthur Hammond.

ST. PATRICK'S CATHEDRAL. ANN GANNON.

AN ECONOMICAL COPYING METHOD

By C. E. OWEN

MANY things are overlooked in the course of a year by the average photographer which, if they were handled right, would net him dollars.

Many of these are small items, of course, and require considerable attention, but in these days of high priced materials, they are real leaks in the business and will merit more consideration than is usually given to them.

I will describe a method of copying certain things without plates by the use of paper negatives which I have used considerably in a commercial way.

I do not pretend to have discovered anything new, and am aware that the process is being used many times, but doubt that it is generally known how useful it is in many cases. If it is necessary to make a fac-simile copy of a business letter, I do not get out the camera and an expensive plate for the work, but I lay the letter face up on the printer; on top, face down, I lay a piece of hard glossy paper and make a negative print of it, which is developed in strong M Q developer with plenty of bromide to give contrast.

This negative is finished in the regular way, and when dry it is laid on the table and covered with paraffine wax which is ironed into the paper with a hot iron until it will not absorb any more. This is only applied to the back of the negative and dries out immediately when it is cold. It is then ready for prints as the wax has made the paper translucent so that it can be printed by a short exposure in the printer. The prints are now made in the same manner as the negative, on the same kind of paper, and with the same developer. The result should be at least as good as the original, and may easily be made better than most originals. This is all accomplished in a few minutes' time at a cost of a few cents, and we have a result which is equal in every way

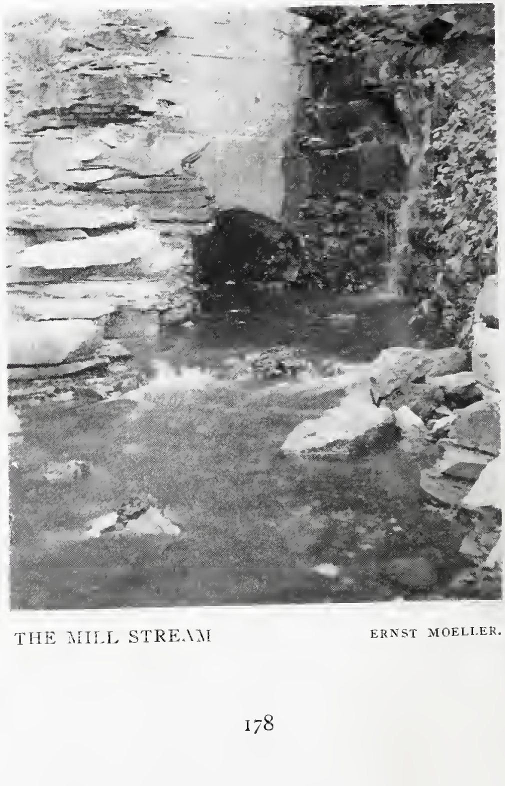
BECALMED. HARRY D. WILLIAR.

to that obtained by the use of glass plates, cameras, filters, etc.

Vaseline can be used for making the negatives transparent, but must be carefully wiped off the outside before any printing is done as the grease prevents the developer from working, if it should get on the prints.

A yellow glass may be used in the printer to help give contrast in letters in pale blue ink on heavy linen stock, but is not necessary in most cases.

Cuts, lithographs or music can be copied in the same manner if it is only printed on one side, and enlargements or reductions can be made with the camera, substituting bromide paper for the plate, and then proceeding as above with the printing. The cheapness of this process enables the photographer to do things in this line at a profit which could not be done by the use of plates.



THE MILL STREAM — ERNST MOELLER.

BETWEEN POSES.

G. W. HARTING.

THE EVOLUTION OF PHOTOGRAPHY DURING THE PAST FIFTY YEARS

(Illustrated by Pictures of the Author, taken at different periods throughout that time)

By WARREN E. COMSTOCK

THE word "Photography" is derived from two Greek words meaning "Light" and "To write." It is the science and art of producing pictures by the action of light on chemically prepared (sensitized) plates or films. Karl Wilhelm Schaele, in 1777, was the first person who applied chemical and spectrum analysis to the science of photography. One of the Seven Wonders of the Modern World evolved in the last half-century is Photography.

THE DAGUERROTYPE.

June 15, 1839, Louis Jacques Monde Daguerre perfected the process which was given his name. On that date the French government, in honor of his discovery, appointed him an officer of the Legion of Honor. That same year, Miss Dorothy Catherine Draper posed for a Daguerrotype for her brother, Dr. John W. Draper, in New York. As far as known, she was the first person to pose for a photograph; she was obliged to pose for *six minutes*. It now takes 1/1500 part of a second to produce the same result. This important personage was a handsome, vivacious woman, known in New York society as "Dolly" Draper. She died at the age of ninety-five, in December, 1901, at Hastings-on-Hudson.

Daguerre was born in France in 1789, and died there in 1851. He was a painter and physicist. He was greatly assisted in working out his process by J. Nicephore Niepce, who died in 1833, before the process was successfully completed. August 2nd, 1839, Daguerre's process, together with his system of transparent and opaque painting, was published by the French government, and soon became generally known.

From 1829 to 1833, while Daguerre and Niepce collaborated,

*"The raggedy man, he knows most rhymes,
An' tells 'em if I be good sometimes."*

NANCY FORD CONES.

their productions were called "Heliographic Pictures." Their method of fixing the images produced in the camera was by using metallic plates, coated with a composition of asphalt and oil of lavender. This, where acted on by the light, remained undissolved when the plate was plunged into a mixture of petroleum and oil of lavender; and the development of the image was affected by the action of acids and other chemical re-agents on the exposed surface of a copper plate.

Figure 1.

Daguerre's process, when perfected, consisted of five operations, viz.:—the polishing of the silver plate; the coating of the plate with iodide of silver by submitting it for about twenty minutes to the action of iodine vapor; the projection of the image of the object upon the golden-colored iodized surface; the development of the latter image by means of the vapor of mercury; and lastly the fixing of the picture by immersing the plate in a solution of sodium hyposulphate. The exposures required *from three to thirty minutes.*

Figure 2.

Illustrating article "The Evolution of Photography During the Past Fifty Years," by Warren E. Comstock.

Several improvements were effected until 1841, when Fox Talbot evolved what he called "Calotype or beautiful pictures," which was a distinct advance over the original Daguerrotype.

The next step in Photography was the "Albumen Process on Glass," invented by Niepce de St. Victor, a nephew of Nicephore de Niepce. He employed a glass plate, and coated it with iodized albumen. This was later perfected by G. Le-Gray. Here is where the faithful hen comes in to *lay her tribute* on the altar of the Arts. The whites of five fresh eggs, mixed with about one hundred grains of potassium iodide, about twenty grains of potassium bromide, and ten grains of common salt, beaten up into a froth and allowed to settle for twenty-four hours, when the clear liquid is decanted off. A circular pool of clear liquid is poured on a glass plate, sweeping off the excess of albumen, and so leaving an even film. Then baked in an oven till hard, then given a silver nitrate bath of five minutes duration, sensitized with acetic acid and exposed while still wet. The image was then developed by gallic acid in the usual way.

In 1850 came the Collodion Process by Frederick Scott Archer of London. Positive pictures by this process were made to stand out against black velvet in white, or the positive picture was produced on japanned iron plates, or japanned leather. The latter is illustrated by the picture of the Author (Figure 1) taken in 1859, just twenty years after the first photograph ever produced.

Next, in chronological order, came Dry Plates, the first experiments being made by Marc Antoine Augustine Gaudin, April 22, 1854. A great advance was made in all Dry Plate processes in 1862 by an American, Major C. Russell, who used what is known as the "Alkaline Developer." The illustration (Figure 2) is a picture of the author taken in 1861 on a copper plate. In 1864 W. B. Bolton and B. J. Sayce published the germ of a process which revolutionized photographic manipulations.

It may interest the lay reader to know that beer, coffee, gum and albumen were respectively used as preservatives in photographic processes.

HOMEWARD BOUND. L. M. A. Roy.

The development of this art, and times of exposure, are as follows:

Daguerrotype,	Half hour's exposure.
Calotype,	Two or three minutes.
Collodion,	Ten seconds.
Collodion Emulsion,	Fifteen seconds.
Rapid Gelatin Emulsion,	1/15 second.

In March, 1878, C. Bennett evolved what was really the Photography. The first successful instantaneous pictures by Colonel Stuart Wortley in 1879, by raising the temperature of the vessel in which the emulsion was stewed to 150 degrees F. Instead of *days* being required to give the desired sensibility, only a few *hours* were necessary.

Flashlight Photography.

In 1897, in Chicago, James W. McDonough, a man of science, was killed in perfecting the process of Flashlight Photography. The first successful instantaneous pictures by this process, in rooms or halls otherwise too dark for photography, were taken by F. W. Peck, of Chicago.

The Skiograph.

For several years the Skiograph—pictures of the stars—have been taken with "Dark Light," thus bringing within range of human vision stars that cannot be seen with the largest telescope. So it is with the X or Roentgen Rays. Opacity is merely for an eye like ours, which, if constructed differently, would enable us to see through walls of any kind. Thus kind providence prevents us from seeing, and also hearing, too much for our own good.

Color Photography.

A practical plan of producing images in approximately natural colors has been devised by preparing three positives of the same object; one illuminated by a red, the other by a green and the third by a blue light. The image from these three transparencies, when visually combined, will show the colors of the object as nature paints them. This was first worked out by Frederick E. Ives, of New York, in 1888.

Photography in War.

The present war has demonstrated the ever increasing adaptability of photography to military uses, especially in reconnoitering.

Taken from aeroplanes, exposure is started, stopped and regulated by the pilot, by means of a small lever, conveniently located. The film is wound on two reels, like those in a Kinetoscope, deriving their motion from a small propeller, set in motion by the air current, flowing past the plane. Good pictures are often taken from an elevation of four thousand feet.

In 1914 the British secured many successful pictures by fastening a camera weighing two and a half ounces to the breast of a carrier pigeon, the exposure being regulated by a shutter, arranged to operate by clockwork at a definite time after the bird was released. Means were thus provided for taking eight successive pictures.

Autographic Kodak Film.

In 1913, Henry J. Gaisman patented the above film, thus furnishing a permanent record of any particulars desired by the photographer. In 1914, the Eastman Kodak Company paid the inventor a large sum for his patent. The same year the first successful photographs under water were taken by means of a Cinematograph Camera.

The Biographic Camera.

By means of this camera, botanists have succeeded in perfectly demonstrating the growth of plants, and physicians have reproduced surgical methods, and the operation of the lungs in breathing. The photograph (Figure 3) of the Author was taken in 1912 and from it was made the last illustration (Figure 4)—a Medallion by Miss Lorena McWilliams, a pupil of Jorgen C. Dreyer, the sculptor, made in 1915.

Medals or Medallions.

These belong to two periods—ancient and modern—separated by a wide interval. The early Greek and Roman medals were the products of the mint of Ancient Rome, struck in the Provinces under the Empire. They were made of gold, silver, copper or brass. They were struck for prizes in athletic games, or in commemoration of great events. They were in the form of a coin, stamped with a figure or device to preserve the portrait of some person, or the memory of some illustrious action. The gold medals began with Constantine and continued to the fall of the Empire; the copper, from Augustus to Alexander Severus. A beautiful and famous gold Medallion exists of Augustus and one of Domitian.

Figure 3.

Illustrating article "The Evolution of Photography During the Past Fifty Years," by Warren E. Comstock.

In modern times the French series is deserving of special mention as the most perfect and complete in the world. It commences under Louis XI, and continues to the present day, illustrating every important event in the history of France.

The English series commences under Henry VIII, but as works of art the latter are not high. The Italian and German medals of modern dates are very fine. The Papal series, commencing with Paul V, are worthy of commendation.

One of the earliest American Medals is that presented to General John Armstrong for his successful attack in 1756 on the Indians at Kittanning. During the war of the Revolution, Congress presented a gold medal to Paul Jones for his defeat of the British frigate Serapis, when he commanded the Bon Homme Richard, September 23, 1779.

One hundred and eighty-nine medals were struck in honor of Abraham Lincoln. Medals were also issued in honor of Garfield and McKinley, Sampson, Schley and Dewey. A few were struck during the Spanish-American War.

Historical Exhibit

The National Museum at Washington is assembling an historical exhibit of the Art of Photography from its beginning up to date. In this collection is a Panorama Daguerrotype. This consists of five plates, of the harbor of San Francisco in 1852. The picture was taken at a time when there were fourteen hundred vessels rotting in the harbor, because all the crews had deserted to go to the gold diggings.

Kinetoscope.

This, the most wonderful accomplishment of modern photography, was patented in America in 1896. Thousands of people are constantly employed in their production, and millions are instructed and amused by their life-like results.

The Cameragraph.

This is the latest Photographic appliance, which instantly produces facsimiles of any written or printed page, photograph or medallion. It exposes, develops and fixes all the above mentioned things, entirely within the machine, without the use of a dark-room, plate or film. All the illustrations of this article were photographed by the Cameragraph without removing the pictures from their frames. This brings photography into practical commercial use.

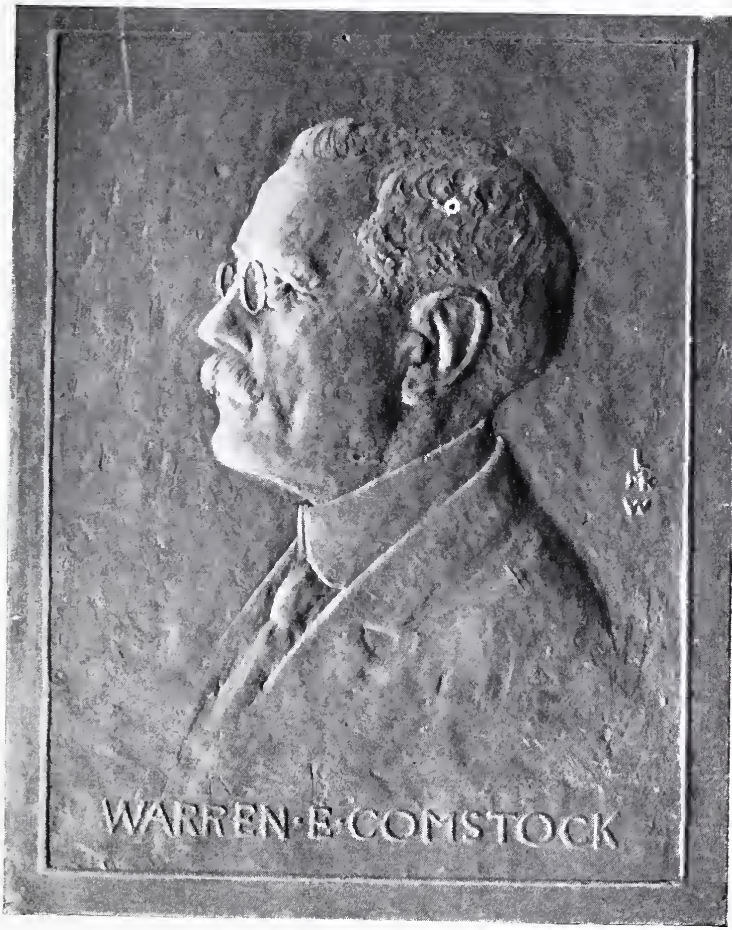


Figure 4.

Illustrating article "The Evolution of Photography During the Past Fifty Years," by Warren E. Comstock.

Figure 6.

Illustrating article "A Beginning in Flower Photography," by John H. Lovell.

A BEGINNING IN FLOWER PHOTOGRAPHY

By JOHN H. LOVELL

FLOWERS are very frequently photographed by both amateur and professional photographers, but most of the prints are far from satisfactory. In not a few instances the flowers are shown on so small a scale, or in such large masses that the species can not be recognized except by the aid of the legend beneath the picture. Some months ago a photograph of a branch of cherry bloom was published in a popular journal by a well-known specialist, and while the technique was doubtless beyond criticism, not even an expert

Figure 2.

botanist could have told to what tree the irregular-shaped plane of whiteness belonged. Blue colors usually appear as white and orange and red as deep black, while even white is often a dark gray.

There are very apt to be a lot of twisted and bent leaves, which are anything but pleasing to the eye, many of which come only partially within the field of the lens. Or there is the inevitable, highly ornamented bowl or vase, placed in the center of a round table, containing a variety of *artistically* arranged flowers. Others seem to regard dim and indistinct figures in a dusky atmosphere as highly impressive, especially in the case of white lilies. I do not say that many of these photographs do not possess merit, but they certainly afford little pleasure to any one who has an intimate knowledge of flowers.

The first rule that I would lay down in the photographing of flowers is that the flower should be shown as nearly as possible as it appears in nature—in its natural colors if possible, but if not, at least in the correct shade of monochrome. Except in the case of very large specimens the figures should be natural size, and the details should be so clearly shown that its name can be easily determined from the photograph. Finally it should possess sufficient beauty to be well worth preserving for that reason alone.

Obviously the best results can not be obtained outdoors, since a long exposure in the open air is impossible. In the course of a minute or two there will nearly always be some passing zephyr that will produce motion enough to spoil the negative. Look over a series of pictures taken in the open, and no further argument will be needed to convince you on this point. Flowers, foliage and background are all likely to be caricatures of nature's products. Of course it is often important to photograph trees and shrubs in foliage, flower and fruit, or, when bare, to show their habit of growth; but I do not class such prints under flower photography. So far as the individual flower is concerned they have no value.

A room with eastern and northern windows is desirable. Cross-lights which are so objectionable in portrait photography are helpful in bringing out the forms and details more clearly. Have as little furniture in the room as possible and a bare floor—carpets are dust holders. I prefer to photograph in the morning from 10 A. M. to 12 M., on clear days.

In order to photograph flowers natural size a camera with a bellows having an extension of twenty-two to twenty-four inches is required. The editor of *Camera-Craft* says: "To get a picture natural size of an object you must rack the lens out to double its focal length and the flowers must be a like distance from the lens. So to fulfil your requirements you

MORNING MIST. Kate Smith.

simply want a camera with an extension equal to twice the focal length of the lens. That is all there is to it. Or to turn it around, all you need is a lens that has a focal length a little less than half the extension of the camera." Do not scrimp on your camera but buy one having all the various adjustments. An expensive lens is not necessary, although it possesses some advantages in speed and depth. A rectilinear lens costing fourteen or fifteen dollars will answer every purpose. Use plates and have three or four plate holders. A 5 x 7 plate is the best for flower photography. Smaller plates can be used and enlargements made, but this method will hardly commend itself to the beginner, moreover, much of the finer detail is likely to be lost. A 5 x 7 plate will be found large enough for most flowers, and is in many other ways the most convenient size. The whole outfit, including apparatus for developing negatives, should not cost over fifty dollars. A Wratten K3 filter and a Watkins or Wynne Exposure meter should be added.

In photographing flowers natural size the camera should stand in a vertical position, and the flowers be laid upon a sheet of plate glass so that they appear as though floating in the air. This arrangement does away with bowls and vases, largely with shadows, permits of more effective lighting, and of bringing leaves and flowers in the same horizontal plane.

If economy is not an object by all means buy a laboratory stand, such as is offered by the Eastman Company for twenty-five or forty-five dollars. I do not believe in makeshifts if they can be avoided. McFarland in his little book on *Photographing Flowers* describes a vertical stand of a different design which can be made at any wood-working mill; but the cost is about the same as the above—he also figures a more simple stand.

Unfortunately to most beginners in photography expense is a serious item; and to them the vertical stand designed by the writer, which, without the sheet of plate glass, costs only about one dollar and twenty-five cents, will doubtless be of interest (Figure 1). It consists of a smoothly planed board, 5½ feet long by 1 foot wide (A), with a narrow slot in the center 3 feet long (B), beginning 8 inches from the top; and side pieces 2 inches wide and 4 feet 3 inches long (C), in which are notches one-half inch wide and 1¼ inches apart, which hold the cross-piece (D). Two brackets (E) six inches from the floor support the sheet of plate glass (F). The leg (G), which is hinged to the back of the stand, should be attached to some fixed object, or to a weighted box in order that the stand may be held firmly in a vertical position. The camera is placed on the movable cross-piece (D), and is clamped to the board by a thumb-screw, which passes through the slot; a

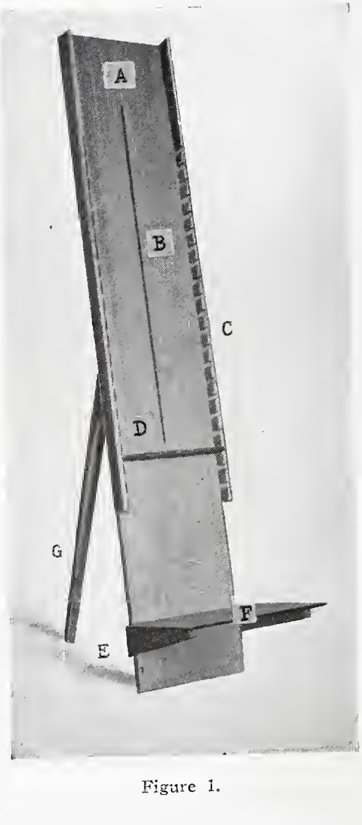


Figure 1.

metal washer prevents the thumb-screw from slipping through the slot. After this cross-piece has been placed at a distance of twice the focal length of the lens from the sheet of plate glass, its position need be changed but rarely. While this apparatus will give excellent results, buy a laboratory stand

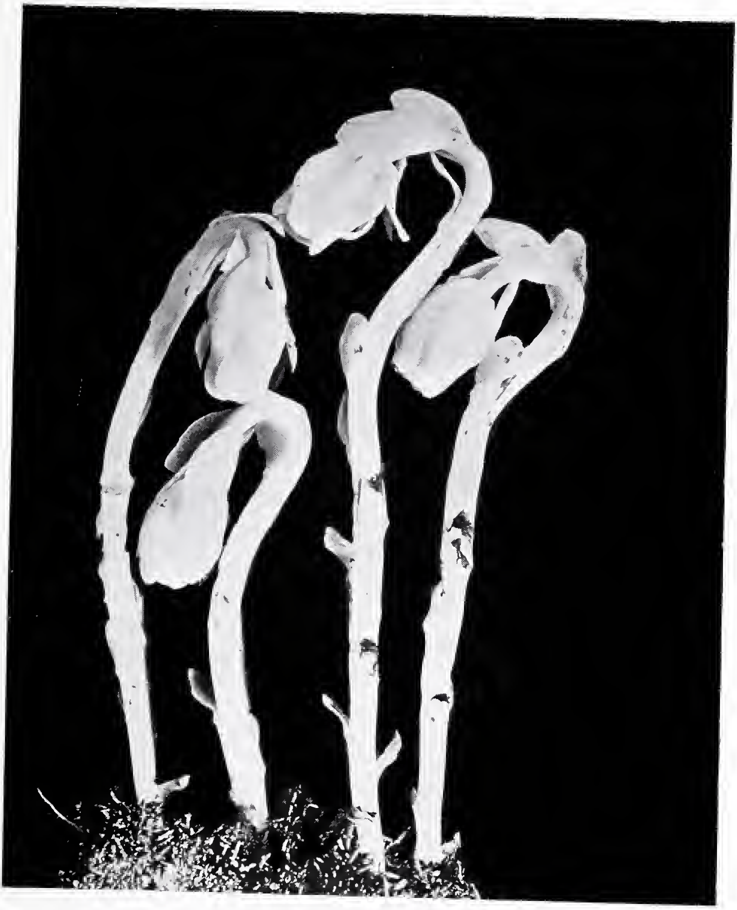


Figure 3.

as soon as you can afford it. Don't consider going without the best apparatus a virtue; it is not, it is merely a privation.

The beginner is now ready to attempt his first picture. A writer in *Outing* some years ago in an article on flower photography declared that from fifty to five hundred plates might be destroyed before a printable negative was obtained. Reference is made to a photographer who later became an expert—who made and destroyed a thousand negatives of flowers before he obtained one that pleased him. Flower photography is difficult enough, but it is hardly as bad as that, although many disappointments must be expected and much patience is required.

It seems desirable to insert here a few words in regard to collecting and preparing flowers for the camera. If fragile wild flowers are to be used, which must be brought from the fields and woodlands, they should be placed as soon as gathered in a botany can—an oblong tin box which can be procured from any dealer in natural history supplies. The interior should be kept damp by a ball of moist cotton. On returning home cut off the ends of the stems and place the flowers in glasses of water, and store in a cool dark room or cellar.

Figure 4.

Flowers should be selected which have just opened or about to open. Objection is frequently raised that delicate woodland blossoms will wilt before they can be brought home, but thirty years of experience has shown me that this difficulty is largely specious. Most writers on flower photography dwell much on the danger of the floral organs moving slightly and spoiling the negative. In my personal experience, where the flowers are laid on a sheet of plate glass, I have found this danger wholly imaginary.

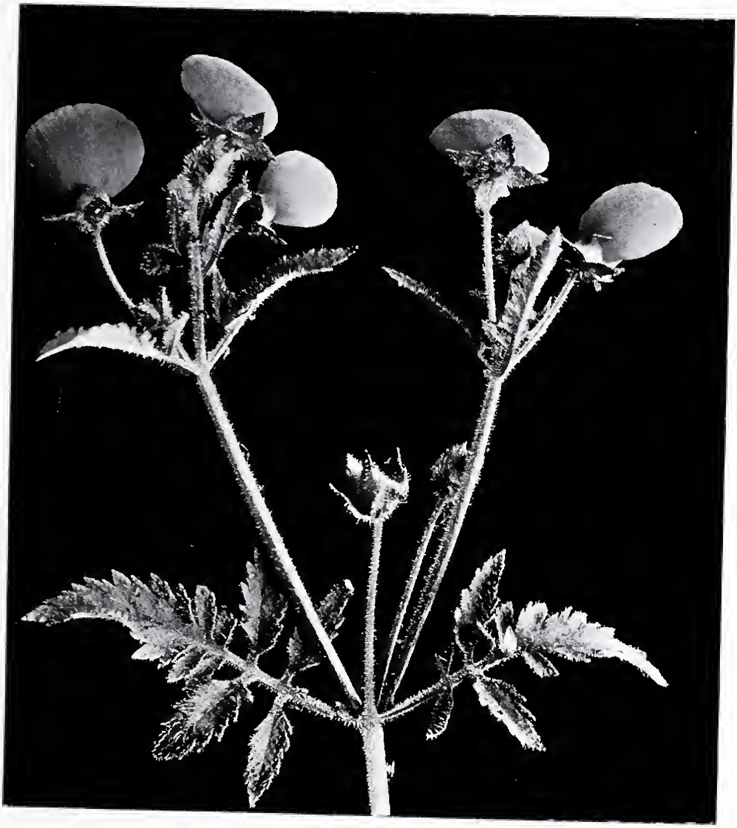


Figure 5.

Panchromatic plates are, of course, a *sine qua non.* I use the well known Wratten and Wainwright plates, but there are other excellent brands on the market. A panchromatic plate is a plate the emulsion of which has been treated with aniline dyes so that it is rendered sensitive to all the colors of the solar spectrum; for example, the addition of a very small quantity of cyanin blue to an emulsion causes it to become very sensitive to red waves of light.

The ordinary plate is sensitive chiefly to violet and blue rays, a trifle to green, and not at all to yellow and red. In other words, it sees the colors as the human eye sees them when it looks through blue glass. Blue glass absorbs all the rays of light except the blue which pass through it. But the ordinary plate is not only chiefly sensitive to blue waves of light, but it is extremely over-sensitive to them; and thus it results that it shows blue as white and yellow, orange and red as black, whereas blue should appear as a medium shade of gray and violet as a dark shade, and the equivalent of yellow is nearly white.

But even the panchromatic plate is over-sensitive to blue waves of light, and it is thus necessary to absorb a large part of them by the use of a yellow filter. A panchromatic plate with a Wratten K3 filter gives the prismatic colors correctly as they appear to the human eye. Let the reader send to the Eastman Kodak Company for "Color Plates and Filters for Commercial Photography." He will also find "Practical Orthochromatics" Photo-Miniature, No. 92, helpful, as well as "Color-Correct Photography" by T. Thorne Baker, etc. If the reader will turn to page 16 of "How to Make Good Pictures," published by the Eastman Kodak Company, or to page 11 of "Orthochromatic Filters" he will find charts showing the correct values of the spectrum colors in monochrome. From these charts it appears that violet is very dark, red a medium shade of gray, and yellow almost white, that is, yellow exceeds all the other spectrum colors in luminosity or brightness, while violet is the least luminous.

White and black flowers can be portrayed almost as faithfully as they occur in nature. Black corollas are comparatively rare, and are represented among wild forms chiefly by Bartsia and under cultivation by the black tulip and black pansy; but white flowers are most common both in the American and European flora. In northeastern America out of 4000 species of flowering plants, 956 have white flowers.

More or less shading or shadows are necessary to bring out clearly the forms of white blossoms, since otherwise they appear as bald masses of whiteness. This is apparent in the photograph of the white snapdragon (Figure 2). Notice how every fold and indentation is clearly shown. Less shading is required in the snow-white, smooth flowers of the Indian pipe (Figure 3). Even the veriest tyro in botany can easily recognize these species; and the pictures are hardly less beautiful than the flowers themselves, which are evanescent while the prints are permanent. It is impossible to obtain equally good results in outdoor work with the camera. Finally there are no vases or supports to distract the attention.

Prismatic green gives a light shade of gray; but in foliage there are light and dark greens, yellow-green, red-green and blue-green, so that the depth of the shade varies constantly. In Figure 4 of the young ovulate cones of the balsam fir, the cones are a pale green, the leaves a dark green and the growing tip a whitish green. In printing it is better to sacrifice the foliage than the flower, but the development of the former can usually be restrained if necessary.

In Figure 5 are shown the pale yellow flowers of a delicate annual species of Calceolaria, which on the ordinary plate would appear nearly black. Figure 6 is a photograph of the pink flowers of the Begonia "Glory of Lorraine." Without the use of a ray filter the orange-colored stamens in the center of the latter flowers would be nearly black. Figure 7 shows two spikes of the violet-blue flowers of the pickerelweed taken on a panchromatic plate with a K3 filter. Dark red and deep purple flowers should be darker than the above illustrations.

Let us now return to the practical work of flower photography. Secure the camera to the vertical stand in such a position that the image of the flower on the ground glass shall be natural size, or, as I prefer, a trifle larger in order that the details may come out more clearly. Lay the flower on the sheet of plate glass, taking care that none of the flowers or leaves shall lie partly outside of the field of the lens. Leaves cut in two by the edge of the print remind us that we are looking at a picture and not at the object itself. A part of the flowers should be removed from dense clusters, especially those on the back. Bring the flowers and leaves as nearly as possible into the same horizontal plane.

Next comes the question of backgrounds to be placed under the sheet of plate glass. On the whole the writer believes that more brilliant effects can be secured by using only deep black and pure white than in any other way, although a gray background often gives pleasing results. For the black background use black velvet, black cardboard gives a gray; white cardboard will answer for the white background. The plate glass with the black velvet behind it makes an excellent mirror, and, if not prevented, your prints will astonish you by showing the reflection of the front of your camera, or of the ceiling. This may be avoided by making a light wooden frame a little larger than the plate glass and covering it with black cardboard. A similar frame of white cardboard should also be prepared. Cut a hole in the center of the cardboard, or rather a little to one side, and tie this screen by means of two strings or elastic bands over the front of the camera. The black screen should, of course, be used with the black background and *vice versa*.

In focusing the lens upon the flower a piece of stiff paper one-half inch square on which there are red letters of various sizes will be of much assistance. Do not forget to remove it. Set up a reflector on the side of the camera away from the window. Put the panchromatic plates in the holders in an absolutely dark room. Stop down to 128 U.S. Close the shutter and place the plate holder in the camera.

"Are you not stopping down too far?" "Stop 128 is a very small opening, requiring too long an exposure." To these objections it may be replied that depth and detail can only be obtained by using a small stop. I have used even a smaller opening with advantage. A long exposure is required, but I have never experienced any difficulty in giving as long an exposure as was required.

Exposures will evidently vary in length according to the time of day or year and the conditions of lighting. For photographing a white flower, without a filter, on a summer morning one minute or a little less will usually be sufficient; but with a poorer light a longer time may be desirable. If foliage is shown the time should be lengthened a little. With orange, violet, blue and red colors, when a ray filter is used, it may be necessary to extend the time to two, four, six, or even ten minutes.

The Wratten K3 filter requires an exposure four and one-half times longer than when the lens is unscreened. A ray filter should always be used with orange, blue and purple hues, indeed, it will not be amiss to use it with any color, as most flowers are slightly variegated. The K3 filter should be used only with panchromatic plates. Err on the side of over-

Figure 7.

exposure. An over-exposed negative will require a longer time for printing, but may often be made to yield a good picture. I have, however, met with little success in attempting to print from under-exposed negatives of flowers.

Directions for developing Wratten Panchromatic Plates are enclosed in each package. With tray development a special green safelight must be provided, but the beginner will do well to restrict himself to tank development, in which case the plates should be placed in the tank in absolute darkness. These plates are backed to prevent halation, which is likely to occur in photographing white flowers. It is usually recommended to remove the backing immediately after development; but I prefer to wait until they have been taken from the fixing bath, when it may be done leisurely and in daylight.

If I have given these directions somewhat dogmatically, it is because, I believe, the beginner likes to be told definitely what to do, and not to be constantly given an alternative. He finds it confusing to attempt to decide between two methods when he knows nothing about either. Undoubtedly a small volume might be written on flower photography, and still leave much to learn.

The photography of flowers, natural size, is not likely to become a popular pursuit among the great army of Kodakers, who are content to press the button and leave someone else to do the rest. Few will have the patience to follow the prescribed methods, but I know of no series of photographs which will yield more lasting pleasure than one of flowers as they grow in nature. Portraits of people will appeal chiefly to acquaintances, ordinary landscapes soon become tedious, pressed flowers fade, and a *hortus siccus* is after all only a plant catacomb; but life-sized, truthful pictures of flowers rival the flowers themselves in beauty and perennial interest.

PRIMULA. NATHAN R. GRAVES.

TOWNSEND HARRIS HALL, CITY COLLEGE, NEW YORK, IN HEAVY SNOW-STORM. HASWELL C. JEFFERY.

WAR vs. DEVELOPING AGENTS

By HENRY F. RAESS

A SITUATION unique in the history of photography was caused by the great European conflict. Practically all of the agents used for producing an image on plates, films and paper after exposure are (or were) made in Germany.

Hydroquinone, which was first used by Abney in 1880, was at that time very expensive, costing several dollars per ounce. The rapid growth of amateur photography in the United States, and the high price for this substance, induced chemical manufacturers to make it here and the price soon fell (to ninety cents per ounce in 1883). Meanwhile Germany built up an enormous organic chemical industry in which many millions in money were invested. The crude organic products were easily converted into those bodies familiarly known as "developers." This, and the difference in the price of labor, enabled them to undersell our home producers of hydroquinone and so killed the home industry.

This industrial condition thus caused the whole photographic world to depend upon Germany for developing agents and of course many other organic compounds. Of the many substances capable of developing an image only about seventeen are in use. Among these hydroquinone and metol are used most generally, for a mixture of the two in proper proportions possesses such universal application, yielding at once good results with negatives on plates or films, prints on paper, motion picture films or lantern slides.

As the motion picture industry consumes such huge amounts of "hydro-metol" the supplies of these substances were soon exhausted, and as shipments from Germany ceased the price rapidly mounted until hydroquinone, which was selling as low as fifty cents per pound, was quoted as high as $18.00, so it was said, and metol, which had been $4.50 per pound, was advertised at $6.00 per ounce and $80.00 per pound. The other developers did not rise with the same rapidity nor to

STUDY OF A HEAD. CLARENCE H. WHITE.

the same degree, with a few exceptions, but the latter was only after the war had continued for two years.

This condition, akin to panic, was entirely uncalled for. The photographers had gotten into a rut and thought good photography was impossible without hydroquinone and metol. The motion picture people especially thought so and were the cause of the abnormally high prices for metol, for their high salaried "laboratory experts" failed utterly when put to the test. We know of instances where motion picture producers said that good positives were impossible without "hydro-metol" and refused to use anything else even when shown results with other well known developers. The painstaking investigations of the photo-chemists, and especially the work of von Huebl, had fallen upon barren ground.

All developing substances in use can be made to give similar or identical results so far as negatives are concerned, and for positives, paper, film or glass this also holds true, although a little more care must be taken to study each individual developing substance to determine under what conditions it will yield the desired results.

The high prices induced various unscrupulous persons to offer what they claimed to be metol at comparatively low rates, but which was found to be either not metol or metol adulterated with other substances. It was not safe to buy from those unknown even when offered in original bottles. As metol and hydroquinone were the chief substances sought and high prices offered, American manufacturing chemists again turned to the making of certain organic compounds, but it was found that the raw products were not to be had and these then had to be first produced.

Metol (monomethylparamidophenol sulphate) is a very difficult compound to make and it is doubtful if any is being made even now (May, 1917) in the United States, but substances having somewhat similar properties have been offered to the photographers for the past year at prices varying from $10 to $20 per pound. Hydroquinone and paramidophenol are much easier to make and consequently have been on the market for some time. Some of the developing agents with strange names and claiming to be metol substitutes are only paramidophenol.

THE DESERT.

STEPHEN H. WILLARD.

The writer fortunately had some years previously studied the characteristics of many developers, and when the war caused the great advance in prices the knowledge gained then was practically applied, for in the office where he was employed two hundred to four hundred ounces of concentrated developer was used every day, but by using hydroquinone with appropriate cheap alkaline substances two hundred ounces did the work of fourteen hundred to twenty-eight hundred ounces of developer, thereby making a great saving. This developer has now been so improved that metol even at ante-bellum prices would not be of any advantage. This is especially true of results with developing papers. Motion picture positives and lantern slides also show greater clearness than when metol was employed. They say it is an ill wind that does not blow good for some one, for the high prices of hydroquinone and metol were the means of stimulating the manufacture of photographic chemicals in the United States.

GRAND CANYON, YELLOWSTONE PARK. W. H. WOLF.

MAMMY.

GUY SPENCER.

SOME LENS DIFFICULTIES EXPLAINED

By A. LOCKETT

IT is thought that a few brief and practical explanations of certain facts, questions and difficulties relating to lenses, which sometimes puzzle the non-scientific photographer, whether amateur or professional, may prove useful.

In the first place, a really accurate knowledge of the principal focus, or focal length, of any lens is often of great value, if not almost indispensable. So many problems are sure to arise concerning enlarging or copying to a definite scale, photographing in a studio of limited length, or getting a portrait of a certain height on a given size of plate, in which the true focal length is the one essential factor. It will not do to place too implicit faith in figures respecting focus obtained from a dealer's catalogue, particularly a second-hand one, and even when the focus is engraved on the lens mount it is frequently a mere approximation, since objectives are manufactured nowadays by the hundred at a time, and precise identity is impossible. A wise photographer, therefore, will make a point of ascertaining the exact focus for himself at the first opportunity.

There have been many different ways proposed for finding focal length, but the majority involve first focusing for "infinity" or a far-distant object, which is not always convenient, as in the case of workers who only have their evenings available and are restricted to indoor operations. Those methods, too, in which an object is focused full-size are unsuitable with cameras having but a short extension.

Here is a method, believed to be new, though obvious enough in principle, which dispenses with any need of focusing for infinity and has also the merit of not requiring a long extension and of being readily checked. Its only drawback is that it is a little tedious.

Take a foot rule and set it up as a copy. Then, placing

A SYMPHONY. A. MCFARLIN.

the camera so that the rule is as central as possible on the screen, focus it (or any portion of it) sharply with the full aperture of the lens to exactly half-size, and measure carefully the distance between the lens-board and the rule. It should be seen that the back and front of the camera are vertical, as well as parallel with the rule. Next, focus sharply as before till the rule is exactly one-third size, again measure the distance between lens-board and rule, and subtract the first distance from the second, when the remainder will give the focal length. To make sure of correctness, focus a third time till the rule is precisely one-fourth its proper size, and once more measure the distance between rule and lens-board. Sub-

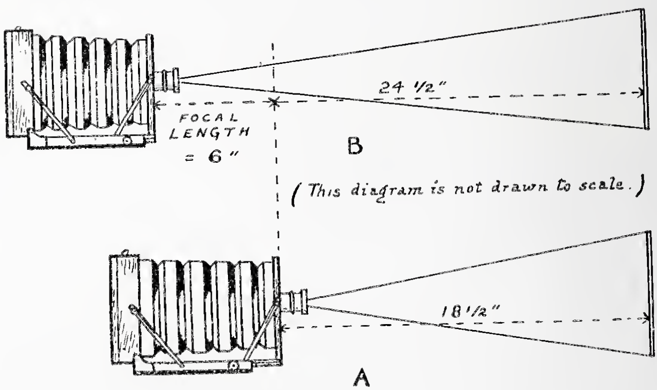


Figure 1.

tract the third distance from the second and the remainder should tally with the first result.

As an example, suppose when the rule is focused half-size, so as to be exactly 6 ins. long on the screen, the distance is 18½ ins., as at A in Figure 1; while when the rule is one-third size, measuring 4 ins. on the screen, the distance is 24½ ins., as at B. Then, 18½ ins. from 24½ ins. leaves 6 ins., which is the focal length. Similarly if, to verify accuracy, the rule is focused to 3 ins. long, or one-fourth size, the distance, providing all has been done correctly, will prove to be 30½ ins., and 24½ ins. from 30½ again leaves 6.

Should a long bench be available, the camera may be placed

THE RIVER, PARRAMATTA PARK, N. S. W. C. E. WAKEFORD.

on this, and the rule secured to an upright easel fixed at the other end. Then, by marking the bench in inches, commencing from the rule, or attaching a paper scale, the distances are very easily read off. It may be explained that the odd half-inch in all supposed measurements just quoted is due to taking the distance from the lens-board, instead of from the node of admission of the lens itself. This does not affect the result, since it appears equally in each measurement, and it is only the difference between them that is wanted.

This brings us to a second common difficulty. In copying or enlarging to a definite size, the photographer often wishes to have the lens a certain distance from the plate, but does not know from what part of the lens to measure. The text-books say all such measurements should be taken from the node of emergence, but the description of the latter is seldom such as to enlighten the non-mathematical reader. In reality, stripped of learned verbiage, the description of the node of emergence is deliciously simple. It is nothing more than a point on the lens axis at a distance from the focusing screen exactly equal to the focal length when the camera is focused on infinity. In cases where it is not convenient to focus on infinity, the node may readily be found by calculating the minor conjugate for a given size of reduction, and using that to measure by. For instance, suppose the focal length of a lens has been ascertained by the method previously described, and found to be 6 ins., as illustrated at B in Figure 1. We here have the camera focused for a one-third reduction, and we know by the familiar rule of conjugate foci that the minor conjugate is always equal to the focal length, plus the focal length divided by the ratio between the linear measurement of the object and that of the image. Therefore, as the ratio here is 3, the minor conjugate focus will be the focal length plus one-third of the focal length, or $6 + 2 = 8$ ins. Accordingly, if we measure 8 ins. from the back of the camera to the front, subtracting the thickness of the focusing screen, and then sufficiently forward on the lens mount to make 8 ins. altogether, as seen at AB in Figure 2, this will be the position of the node, and it may be marked by making a little nick on the mount with a file, in order to recognize it in future. The node of emergence varies in position in different lenses, and in some types it may even be outside the lens altogether, but the same method of measurement applies. One can still make a nick on the lens mount, and remember that the node is such and such a distance from it.

It may be asked, why mark the nodal point on the lens? Why not simply indicate the position of the lens-board or any convenient part of the extension against the camera baseboard, after focusing for infinity, or otherwise finding the node? Since the lens-board and extension move with the

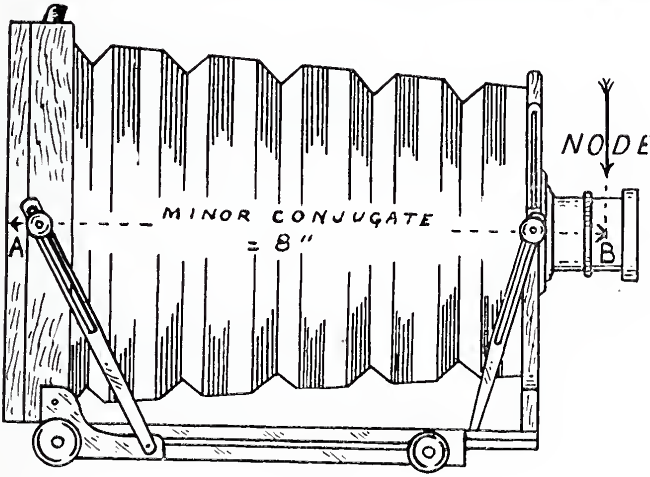


Figure 2.

lens, cannot any measurement equally well be made from either of these? The answer is, that it might be wished to use the lens on a different camera, or on an enlarger, and then the one mark answers for all. If, however, the lens is always to be employed with the same apparatus, there is certainly an advantage in marking the position of the lens-board or extension against the base.

Now, to explain the value of knowing where the node is. As before stated, in copying or reducing to a given size, the distance from the ground-glass or plate to the node is always equal to the focal length, plus an additional measurement, obtained by dividing the ratio of reduction into the focal length. If, for instance, we want a copy one-quarter size, the distance from ground glass to node will be equal to the focal length plus one-fourth the focal length; if a reduction to one-sixth size is desired, the distance will be equal to the focal length plus one-sixth, and so on. If, then, we have marked on the base-board the position of the front when the node is at a distance equal to the principal focus from the ground-glass, it is only necessary, for a one-quarter size copy, to measure forward a quarter of the focal length from the first mark, make a second mark, and bring the camera front to it. Then, by merely moving the camera towards or away from the copy, without otherwise altering its adjustment, until the image is perfectly sharp, the latter will be exactly one-quarter size. Thus, if the lens is of 8 ins. focus, the second mark, for a quarter-size reduction, must be one-fourth of 8, or 2 ins., from the first mark, which means that the front must be racked out 2 ins.; while for a one-sixth reduction, the second mark must be one-sixth of 8, or 1 1/3 in. from the first mark, and the front must be racked out only 1 1/3 in. It will be seen that, having accurately obtained the nodal position and marked the front to correspond, it is quite easy to make a thin cardboard or celluloid scale for copying or reduction, and to fix it on the base-board. We shall then always be certain of getting exact size copies, which is often a very vital matter in commercial work.

The old type of square camera with back focusing is particularly handy for copying to scale. To give an example, suppose we have a lens whose focus has been ascertained to be 7½ ins., and have marked the nodal point on the mount. On screwing it to the square camera, we find the node is exactly 2 ins. from the front, as seen in Figure 3. If, then, we require a half-size copy, the minor conjugate will be 7½ ins. plus half of 7½ ins., or 7½ ins + 3¾ ins., = 11¼ ins. Subtracting 2 ins., the distance of the node from the front, we need only measure 9¼ ins. from the front to the back of the camera, and then simply move the whole camera, or else the easel with the copy, till the latter is seen to be in sharp focus. It will then be exactly half-size. Allowance must, of course, be made for the position of the ground glass. If, say, this is ⅛ in. forward from the camera back, the distance from back to front must be 9⅛ ins. instead of 9¼ ins.

Precisely the same method may be employed in enlarging. Suppose we have a lens with the node marked, and wish to use it on an enlarger. Having screwed it on the front of the latter, we rack the front in or out until the distance from the negative to the node is exactly equal to the focal length, as in Figure 4. To do this, we must place a negative in the carrier, and with a piece of card ascertain carefully how far the gelatine surface is from the edge of the frame. This is then marked outside the carrier. Next, by measuring from the mark to the outer side of the lens-board, and from that

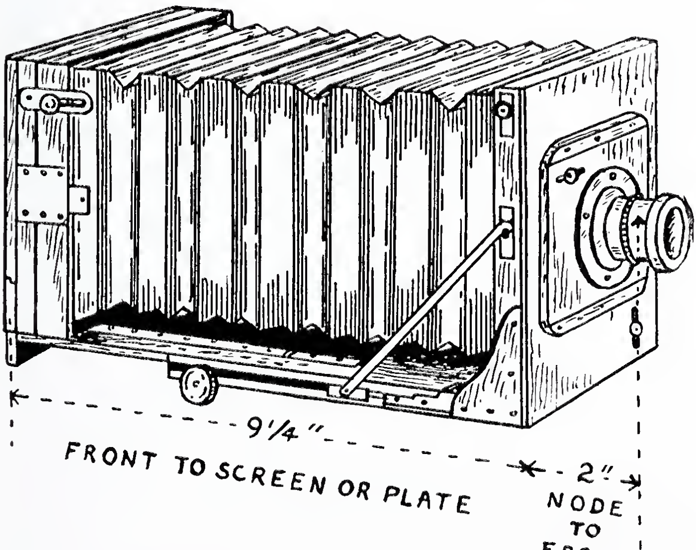


Figure 3.

to the nodal mark on the lens, it is quite easy with a few adjustments to get the latter at its principal focus from the negative. Now, without moving the front, indicate the position of the fixed base-board of the enlarger by a mark on the sliding extension frame carrying the lens, as shown by the arrow. Having done this, we have the same state of things as originally existed with the camera. If, for instance, we make a second mark on the sliding extension frame one-fourth of the focal length behind the first mark, and move the extension frame forward till the mark corresponds with the edge of the base-board, the apparatus is accurately focused for a four-diameter enlargement, and one need only move the easel, without any other adjustment, till the image is seen to be sharply focused. A scale, also, may be prepared and fixed to the extension frame for obtaining enlargements to any other desired size, and this scale will have the same measurements or graduations as that employed with the camera. The only difference is that, in the first case, the sensitive surface or bromide paper is placed in front of the lens and the original or negative behind it, to get an enlargement to a given ratio; while, in the second case, the distances remain the same, but the sensitive surface, or plate, is placed

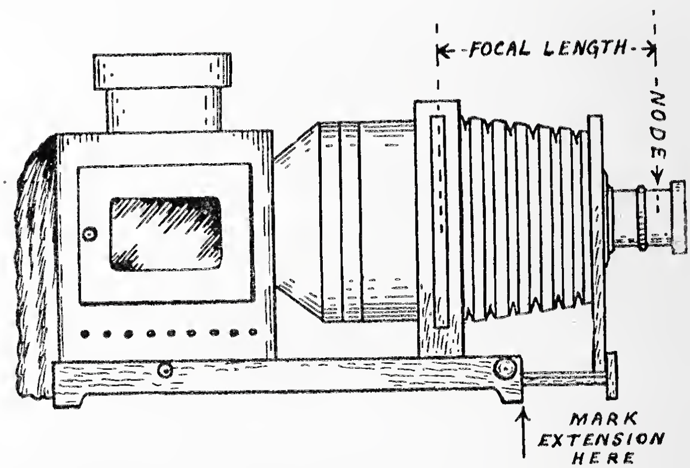


Figure 4.

behind the lens and the original or copy in front, which gives a reduction instead of an enlargement, though still in the same ratio. Where we should get a four-diameter enlargement we obtain a one-quarter size reduction, and so on. Enlargers differ a good deal in design, and in some cases it may be more convenient to mark the baseboard than the extension.

Passing from flat subjects, such as copies, to those including a number of objects at different distances, the photographer is apt to get puzzled as to what factors really regulate fine definition. We hear a good deal about "depth" nowadays, and the would-be purchaser of an expensive anastigmat

ELLIOT STUDIO.

is repeatedly assured by photographic friends that he will not get the same depth of definition as that given by his present R.R. lens of similar focus, unless he stops down the anastigmat to the same aperture. Hereupon, if he is one of those who love needle-sharp negatives and is never of necessity obliged to work in a bad light, he most likely fancies there is nothing to be gained by the change, and remains faithful to his old lens.

Now, there is a subtle fallacy here. Though it is perfectly true that the depth will be the same in the two lenses of the same focus, at the same aperture, it does not follow that the general definition will be identical. It is not only for extra rapidity that one pays more when buying an anastigmat. Besides its ability to be used at a larger aperture than the R.R. lens, which may be regarded as a reserve power, only perhaps needed in a dull light, or for subjects in rapid motion where the exposure has to be cut down, there are other solid advantages. The anastigmat is in every respect more finely corrected than the R.R. It will have better marginal definition, a flatter field, and probably a greater evenness of lighting over the plate. Depth of definition—the property of rendering objects at different distances with approximately equal sharpness—is only one of the factors that go to making up the sum total of uniformly well-rendered detail in the photographic image.

That is not saying, of course, that ultra sharpness is always desirable. The pictorialist will assert emphatically that it is not. Still, for technical, commercial, and scientific work it is often indispensable, and the average amateur, also, has undoubtedly a fondness for it. To all such, at present content with a single lens or R.R., one may give the sincere advice to borrow, if possible, an anastigmat of good make of the same focus as their own lens, and to expose two plates on the same subject, one with the old lens, using the largest stop, and the other with the anastigmat stopped down to the same F number. There will then be little doubt left in the experimenter's mind which negative has the best all-round definition, while enlargements from the two would render the point still more incontestable.

THE ANCIENT HABITAT, ROUEN. L. A. DYAR.

A PRACTICAL FIXING TANK

By JOHN BOYD

TANK development has become so popular that nearly all professionals and amateurs use it, if they would produce uniformly good work.

With films the work can be done entirely without a dark-room, and all without any fuss, until one comes to fixing the image. It is then that we either use a long tray full of the hypo solution, or else seesaw the film through an ordinary tray until the fixation is complete, running in either case all the dangers of scratching that cannot be separated from either operation.

To get away from this, I went some years ago to where they manufacture tile and sewer pipe, and had them fashion out a square tile, with good thick bottom, then glaze and bake it, the same as a sewer pipe. It cost me 80 cents.

As I use 6 exposure films 2½ by 4¼ almost exclusively, I had the fixing tank made for that size. It is 23 inches high, and 4 by 5 inches inside. It will take four films at one time, and leave ample room between each. It holds 225 ounces of solution, and this will thoroughly fix 100 rolls of film, so from an economical standpoint, it far surpasses all other methods.

The films are hung from a home made copper wire hanger, bent so as to rest on the top of the tank, and allow the film to be submerged an inch or two below the top of the solution.

The film after coming from the developing tank is washed, then folded with the film side out. A film clip is snapped on the free ends, and the wire hanger passed into the loop, after which the film is lowered gently into the tank.

By its adoption, I ensure perfect fixing, entire freedom from scratches, and use several hundred per cent less solution than was possible under old time methods.

It is the greatest labor saver I have in the work-room, and I am glad to pass it on to the fraternity for the benefit of whoever wishes to use it.

WESTERN COLORADO. CHARLES L. SNYDER.

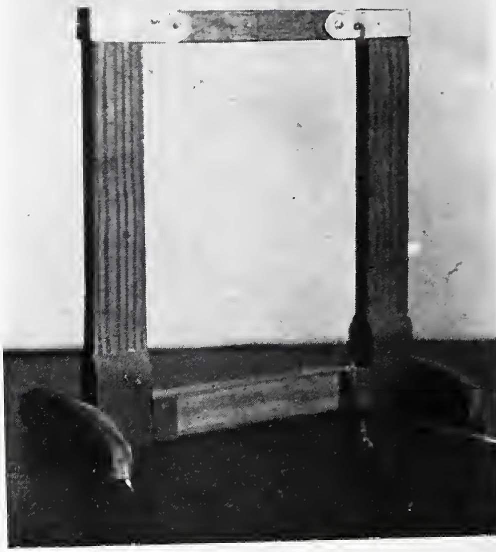


Figure 7.
Illustrating article "Background Frame for Amateur Photographers," by Stillman Taylor.

BACKGROUND FRAME FOR AMATEUR PHOTOGRAPHERS

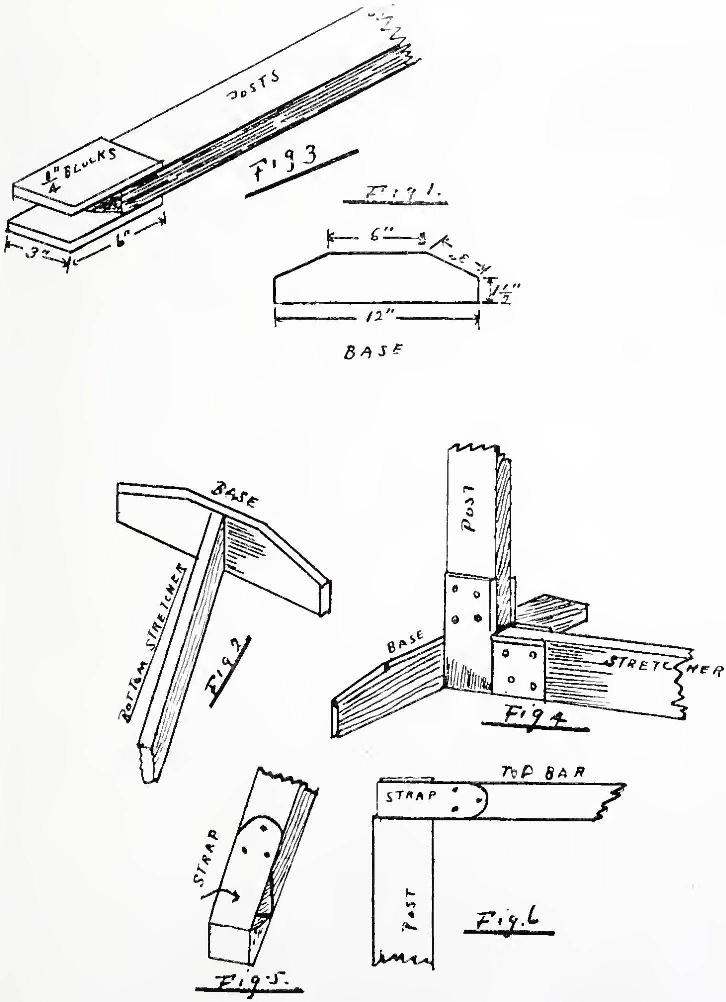
By STILLMAN TAYLOR

THE amateur photographer who is interested in portraiture will find this inexpensive and easily made background frame very convenient. Unlike the solidly put together and heavy carriers often used, this frame is light in weight and may be quickly taken down or set up without screws or fastenings of any kind. When bundled together it may stored in small space.

Spruce makes a good frame, but any wood may be used. The two upright posts are 6 feet long, 2 inches wide and ¾

W. B. Poynter.

of an inch thick. A pair of blocks is fitted on each lower end of the posts, as shown in Figure 3. Four of these blocks will be required, and they should be made 6 inches long, 2 inches



Figures 1, 2, 3, 4, 5 and 6.

wide and about ¼ of an inch thick. The base is shown in Figure 1, and two are needed. Make them 12 inches long, 3 inches wide and ¾ inch thick. Other dimensions are shown in the drawing.

The bottom stretcher is 5½ feet long, 3 inches wide and ¾ inch thick. On each end of the stretcher are nailed the bases, as shown in Figure 2. To keep the posts quite plumb, a pair of ¼ inch blocks are fastened to the stretcher as shown in Figure 4. These blocks are 3 inches long and 2 inches wide, and should be fastened in place with the uprights in position.

The top bar is 5½ feet long, 1¼ inches wide and ¾ inch thick. To each end of the bar, a strap of sheet iron or brass is bent around the top of the posts and the ends fastened to the bar as shown in Figure 5 and Figure 6. To prevent the strap from slipping down the posts, cut a shoulder on the top of the post. The straps are cut 6 inches long and 1¼ inches wide. To get a nice snug fit, bend the strap until it snugly fits the top of the post, and fasten in place with the post and top bar in the proper position. The complete frame will appear as shown in Figure 7.

The sheet or other ground may be fastened to the top bar with thumb tacks or push pins, and may be stretched to take out wrinkles, by pinning the bottom edge to the bottom stretcher.

LINCOLN CATHEDRAL. DR. G. W. ALLYN.

THE POND.

RUPERT BRIDGE.

Figure 1.
ARTILLERY FIRING.
Illustrating article "Military Photography," by L. G. Harpel.

MILITARY PHOTOGRAPHY

By L. G. HARPEL

MILITARY photography is one of the most fascinating branches of the photographic art. In order to be successful a man must have a certain amount of knowledge of military movements and tactics, so as to anticipate the shifting of troops from one position to another and be ready to get the photograph before, or as soon as, the commands are executed.

In order to get photographs containing the required amount of action a fairly good equipment is necessary. My experience has been that there is nothing as good as a camera of the "Graflex" type; although a number of photographs, and very good ones at that, have been made by the writer with a 3-A Special Kodak.

The illustrations accompanying this article have all been made during the maneuvers of the National Guard of Pennsylvania, at Mt. Gretna, Penna. In military photography, action is of the utmost importance. If any appreciable space of time is occupied in securing photographs, there is always

BAYONET COMBAT. Figure 2.

KNOCKED OUT. Figure 3.

Illustrating article "Military Photography," by L. G. Harpel.

more or less posing done which is at once apparent to the careful observer, thus spoiling the beauty of the photo. For instance in the photograph "Artillery Firing" (Figure 1) one of the men handling the shells spied the photographer and turned his face, which would not have occurred in action, as he should have been facing front, not to the side. Otherwise the action in this picture is perfect.

Two other very interesting photographs are "A Bayonet Combat" (Figure 2) and "Knocked Out" (Figure 3). In the former two pairs are engaged in bayonet practice. The action

Figure 4.

HALT!

is superb. The photo "Knocked Out" was not posed for, but was taken during an actual combat and shows one of the combatants stretched at full length with his gun thrown at right angle across his body. This man instantly jumped to his feet, but the camera caught him when he was stretched out full length on the ground.

In the photograph entitled "Halt!" (Figure 4) you see a battery of artillery preparing to halt and go into action. The battery here illustrated was coming at a canter along the road and the Sergeant in command has his hand raised above his head as a signal for preparing to halt. The instant after the

Figure 5.
TROOPS CREEPING UP SLOPE OF HILL.

Figure 6.
GOV. BRUMBAUGH AND STAFF REVIEWING NATIONAL GUARD OF PENNSYLVANIA.

Illustrating article "Military Photography," by L. G. Harpel.

photograph was taken his hand came down, and the battery halted and went into action.

The photograph "Troops Creeping Up Slope of Hill" (Figure 5) was made during a sham battle, and shows one section moving forward under the protection of the fire of the troops to their left.

An interesting photograph is the one showing Governor Brumbaugh and his Staff reviewing the National Guard of Pennsylvania, at a recent encampment (Figure 6). While the Governor is a Quaker, he has taken a very active interest in the welfare of the National Guard, holds a warm place in the

Figure 8.
SOLDIERS AT PLAY. A FOUL TIP.

hearts of all the guardsmen, and is on very friendly terms with the privates as well as the officers. The incident illustrated by the photograph "How Are You, John?" (Figure 7) occurs frequently when the Governor recognizes someone in the ranks whom he knows personally.

To show that the soldier's life is not all work we give one photograph showing the play side of his life (Figure 8). Baseball is the great sport among the troops. Almost every company, as well as regiment and brigade, has its crack baseball team, which are pitted against similar teams. The picture en-

THE POOL. W. H. RABE.

titled "Soldiers at Play" was taken this present year during one of these games at the mobilization camp at Mt. Gretna. The ball, a foul tip, shows very distinctly in this photograph. There is no end to the number of interesting photos which can be obtained by almost any amateur or professional at any military post in the country at the present time.

Figure 7.
"HOW ARE YOU, JOHN?"
Illustrating article "Military Photography," by L. G. Harpel.

Figure 1.

CULTURE GERMS.
Illustrating article "Nitrogen Lamps," by Edward J. Davison.

NITROGEN LAMPS

By EDWARD J. DAVISON

EVER since the advent of the half watt, or nitrogen lamp I have given them every test and have found same a most valuable aid to copying as well as a light to photograph by.

The lamp contains sufficient of the red rays to enable its use with a K1 screen to get perfect color rendering on a panchromatic plate, as against a K3 screen by daylight.

I use two lights, one on each side of the stand, with reflectors, and one above. This gives a light from three directions, cutting off all reflections.

The openings to the lamp socket should be at such an angle as to allow the lamp to burn in a *vertical* position, thus prolonging the life of the lamp. For oval surfaces, like the culture tube (Figure 1) it is possible to cut out the streak of light generally seen down the front in daylight exposures and to show only the contents *side cut.*

With three lamps of 200 watts each, an exposure of six seconds on a plate of Cramer Crown speed at F/16, will give ample time. Color sensitive plates require less exposure.

By keeping a list of exposures it will be very easy to refer to it for an exact exposure at any time, as the light is a fixed factor, while daylight is a *very* variable one. This is a great assistance to those who have only an occasional copy to make.

Steel reflectors with burnt aluminum lining are best, but a different opening must be made from the one already in the reflector.

I have been successful in copying rough prints with the resulting negative, showing very faintly the grain of the original. In other words, you get a photograph of the print, and not the *texture* of the paper.

Figure 1.

EASTER BLIZZARD.

Illustrating article "Travel," by Arthur D. Chapman, on page 236.

TRAVEL

By ARTHUR D. CHAPMAN

IT happens that at one time and another I have journeyed in far countries and to little-known parts of my own land. I have made photographs of the places I have visited, and these pictures are of more than passing interest to my friends.

However, my chief photographic pride is not in the pictures I have made in Canada, Central America and at the Grand Canyon. Those made within ten minutes' walk of my own hypo-tank are the most interesting to me, not on account of any pictorial excellence they may have, but because I have discovered for myself that pictures can be "seen" anywhere, if only the artist will forget that he is looking at familiar things.

This is not easy. I lived in one house in New York for a year before I saw the composition awaiting me at the doorstep. The result of my awakening was "Easter Blizzard" (Figure 1), Page 235.

I used one of the Sixth Avenue elevated stations twice a day for several months and then found "Diagonals." This print has been shown in more photographic exhibitions than any other I have made.

I have lived for several years in Greenwich Village, that notorious corner of Manhattan concerning which all New Yorkers know so much that isn't so. I have not photographed the various Bohemian resorts like the Silver Doughnut, the Black Beehive, the Yellow Potato, but Grove Court (Figure 3), Kelly's Alley and Minetta Place, which are not considered important enough to be distinguished by signboards. Other odd corners which have neither signboards nor names are rich in pictorial interest. Furthermore, I did not feel compelled to buy bad coffee, dispensed by a flat-footed female with her hair trimmed *en casserole,* to get atmosphere.

Figure 2.

DIAGONALS.

Illustrating article "Travel," by Arthur D. Chapman.

The novelists whose works live after them have written of things, people and places of which they were themselves a part. They were big enough to live their literature before the creative instinct had given it form, and then dissociate themselves from what they had seen and experienced, to transmute it into wonderful tales for us who have not their powers of observation and literary expression.

Victor Hugo, Charles Dickens, Patrick McGill are writers who lived their writings. Rembrandt shows us much of the homely life about him in the paintings he has left us.

Pictorial photographers might give to the world prints of the greatest esthetic value and historical interest if they would but analyze and see the pictures in their immediate surroundings. There is too much searching after things strange and unusual in themselves, and not enough analysis and selection of new viewpoints from which to record familiar things.

Some pictorialists have interpreted well the subjects to which most of us are blind. Clarence H. White, in the intimate figure studies he has made in every-day settings, has seen the things to be done right at his hand. Edward R. Dickson, in his series of "Newark Industries," has shown us beautiful interpretations of a factory city—a city which to most of us might seem ugly and sordid.

Don't travel to distant lands to find pictures worthy of your lens. Travel, if you like, and if you can afford it, but look out of your own window first—your photographic masterpiece is there. If you cannot see it, be sure that any good pictures you may make on your travels will be good in spite of your blindness, and not because of your artistic discernment.

Figure 3.

GROVE COURT.

Illustrating article "Travel," by Arthur D. Chapman.

PARAMIDOPHENOL

By SAMUEL WEIN

OF the many photographic developers that have appeared from time to time on the market, none have become more universally popular than paramidophenol. Although it is one of the most popular developers, it appears to be used the least of them all. This is perhaps due to the fact that it has been sold under various trade and patented fancy names, and being little known under its proper name.

Its developing properties and general characteristics are likewise as little familiar to the photographer.

The literature on paramidophenol is extensive and scattered, and, in fact, is reviewed in all chemical (organic) textbooks.

Paramidophenol has many other applications other than photographic, namely: as the basis for the manufacture of a series of dyes, for pharmaceutical preparations, and also as a chemical re-agent.

The use of paramidophenol as a photographic developer originated with Dr. M. Andresen about the year 1888, and since that time the developer has attained wide popularity, and being suitable for plates and papers.

Commercially, it is met with on the market under the following names as a basic salt, viz.:—Unal; and as a solution in citol and rodinal.

In the form of a hydrochloride as kodelon.

And as the sulphate in emergol, kathol and duitall.

Also in the form of a citrate.

From a practical viewpoint the hydrochloride, sulphate and citrate are found to be identical in their characteristics. The object of exploiting paramidophenol in the form of a salt is for the reason that the basic salt is not soluble in water and that these salts are readily soluble in cold water, more so in hot water.

HIS MOTHER'S ROSARY. R. E. SCAIFE.

Paramidophenol is soluble to the extent of 1 part in 90 parts of water; this solubility is not much increased by temperature. The salts are readily soluble in alcohol, insoluble in ether and chloroform—the free base being readily soluble in caustic alkaline solutions.

It comes in the form of white crystals or plates, melting at 184° C. (with decomposition).

Development with paramidophenol results in a negative remarkably free from fog or stains (even an old solution).

An aqueous solution of paramidophenol keeps well for some time, darkening in color with age. When diluted with water, however, it assumes a reddish tinge, and very slowly loses its developing properties, but if diluted with a 5 to 10% solution of sodium sulphite instead of water, it will keep quite well for some time.

Many photographers fail to get density with paramidophenol, simply because they do not develop long enough. The image appears rapidly, but gains density slowly (as in the case of metol and amidol), and there is a temptation to remove at once the negative from the developing solution, instead of giving time for density to be attained. In developing with paramidophenol it is found that a little density is lost during fixing. It is for this reason that development should be carried on a little further.

In reviewing the characteristics of paramidophenol and its salts, it must be borne in mind that whenever a formula is given the developer can be bought of any concern under its respective trade name, and will always give the same results so long as the chemical compound is alike.

Citol and rodinal is paramidophenol in a concentrated solution, and only needs the addition of water to make a working solution. For normal exposures (negatives) use citol, or rodinal, 1 part to 20 parts of water, and 100 parts of water for positives. In the case of over-exposures, use less water, and add a few drops of a 10% solution of potassium bromide. Dilute with from 30 to 40 parts of water for under-exposures. The more dilute the citol or rodinal, the softer will the resulting negative be, and vice versa.

A concentrated solution similar to citol, or rodinal, may be made by dissolving 3 ounces of potassium metabisulphite in

10 ounces hot water, then adding 1 ounce of paramidophenol. Now add to this solution a very strong solution of sodium or potassium hydroxide, until the precipitate first formed is dissolved. For development, dilute with from 10 to 30 parts of water for either negatives or positives, an average strength being 24 drops of the paramidophenol solution thus obtained to each ounce of water.

Citol or rodinal works well with hydroquinone. Herewith is given a typical formula as used for developing papers:

Solution "A"

Water	20 ounces
Hydroquinone	2 drams
Citric acid	5 grains
Sodium sulphite	1 ounce
Potassium bromide	1 dram

Solution "B"

Water	20 ounces
Citol or rodinal	1 ounce
Potassium carbonate	2 ounces

For good snappy prints take equal parts of "A" and "B"; and for softer effects dilute with water in equal amounts.

Citol, or rodinal, makes an excellent developer for lantern slides, as it gives snappy detail, clear shadows and high lights. The formula recommended is citol or rodinal 1 part to 30 parts of water.

Many photographers choose to use the tank for development. For this purpose I give the following formula, taking about 20 minutes: citol, or rodinal, 1 ounce and water 40 ounces.

I now come to paramidophenol in the form of a white crystalline powder or plates, and being readily soluble in caustic alkalies with which it makes energetic developers. Among these is the one suggested by Lumière, viz.:

Paramidophenol	12 parts
Sodium sulphite	200 parts
Lithium carbonate	12 parts
Water	1000 parts

Paramidophenol when made with caustic alkalies is specially suitable for negatives, while if made with the carbonate alkalies is more suitable for positives.

Two such formulas are herewith given:

Potassium metabisulphite	¾ ounce
Paramidophenol	¼ ounce
Water	2½ ounces

Stir the solution well and add gradually sufficient saturated solution of caustic soda till the precipitate first formed is redissolved. For use dilute with from 30 to 40 parts of water.

The other formula suggested is:

Paramidophenol hydrochloride	48 grains
Sodium carbonate	1 ounce
Sodium sulphite	1 ounce
Water	20 ounces

For use dilute with an equal bulk of water.

Dr. Andresen's researches and experiments were many. Among these he used several good developers, which are herewith given:

Paramidophenol hydrochloride	5 parts
Sodium sulphite	50 parts
Potassium carbonate	25 parts
Water	1000 parts

Dilute with from 5 to 50 parts of water for use.

Another formula given by Dr. Andresen is:

Paramidophenol hydrochloride	77 grains
Sodium sulphite	768 grains
Sodium carbonate	384 grains
Water	20 ounces

A good two-solution formula is:

Solution "A"

Paramidophenol hydrochloride	½ ounce
Potassium metabisulphite	¼ ounce
Water	25 ounces

Solution "B"

Sodium sulphite	1½ ounces
Potassium carbonate	1½ ounces
Water	25 ounces

For use mix 1 part A with 2 parts of B, when it is ready for use.

FOAMY SHORES.

MARGARET D. M. BROWN.

ON THE FINER USES OF THE CAMERA

By EDWARD R. DICKSON

I HAVE often-times wished that a magician would one day come forth and convert my camera into a living thing for service, if only that thereby I might be compelled to tend, water, feed it, and bestow similar kindnesses upon it. In the possession of so worthy a companionship I should never exhaust it nor deprive it of vitality, and I should love it and respect it so much that I should call it into service to do only such things as would be useful and uplifting to others.

The pictorialist must add something to photography. Of what use is he if he doesn't? You know, there is such a thing as organization. Organization of the mind—of the speech—and of life, and it is quite true that whatever you organize or fit yourself to do, you will eventually find yourself better fitted to do that thing than he who has no knowledge of co-ordination; for organization is but an intelligent provision of what may be expected of you at a given opportunity.

Suppose then, that with my camera I have trained my mind and eye to see the trivialties of life. This would, of course, interest the trivial. Well, there comes to me one day an opportunity to make a series of important prints, the success of which would enhance the value of photography. I have skill and a good technique, then why should I not grasp this my opportunity? I begin the work, little thinking that my continued indulgence in trivialties would ever disqualify me; until at the completion of my task I discover that my efforts at serious work have become a tragedy, and that as I had never organized my mind to see and to feel the finer and deeper things of life I have elected myself to a negative principle.

That is why the finer uses of the camera can never be applied by pictorialists who imitate the ruder element of news-

UNDER THE ELEVATED RAILROAD. EDWARD R. DICKSON.

paper photographers with minds so filled with the smaller, funnier side of life, that when a big problem looms upon them they are incapable of feeling its bigness, or rising to the magnitude of the task before them.

The finer uses of the camera can never be consistently applied by the pictorialist of superficial brilliancy who never completes his apprenticeship which would make him eligible to enter upon a stage of nobler development.

The finer uses of the camera are those which may be employed to express one's self, and to express one's self there must be self-development and a humility of spirit which can only be the product of fine growth.

The finer uses of the camera are those which may be used to contribute toward the progress of photography, whether this be in the dark-room, studio or afield.

And so you see, the finer uses of the camera may be expressed in one word "motive," for motive centers in the individual, and if the individual is capable of fine growth the result of his work in photography, or in any other art, can be nothing but the expressions of an exalted mind.

These are the finer uses to which the camera may be put. They are exacting, for they aim at perfection, and this little essay is intended for the photographer who in his life and in his work has reached the point where his love for expressive beauty has transcended that of perfunctory operation of shutter and lens. It is not intended to say to you "be ever serious" or "be ever comic," since strict adherence to either would lead to a despised conventionality—but to wish that you would love your instrument more, and use it with greater respect, so that you may ever realize that humility is the path to greatness; that you may also remember that one day a raindrop fell from a spring cloud, and seeing the wide expanse of the sea was shamed. "Where the sea is," it reflected; "where am I? Compared with that, forsooth, I am extinct." While thus regarding itself with an eye of contempt, an oyster took it to its bosom, and fate so shaped its course that eventually the raindrop became a famous royal pearl. It was exalted, for it was humble. Knocking at the door of extinction, it became existent.

PIEDMONT ROAD. Edgar A. Cohen.

THE CAMERA IN WINTER

By J. WILL PALMER

WHY is it that with the coming of November days, nine-tenths of the amateurs lay aside their camera in some out of the way place, there to lie in idleness, until the following May, or June? Think of it. Do you realize that you are allowing that camera to while away, in sheer idleness, a time when it should be doing some of the very best work of the entire year?

How many of our readers have a dozen really good negatives of "Snow Scenes"? I venture to say not one in fifty! Why is it? Have you never tried for them? Have you tried, and failed? Or, have you simply felt that there was no beauty in snow scenes? In either case I can assure you that you have missed a whole lot of pleasure. But if you never have been able to see pictures in winter landscape, for goodness sake, start out next Sunday, after church. Leave your camera at home if you wish, but go prepared to see some of the most charming bits of nature you have ever gazed upon.

If you are so unfortunately located that it would be necessary to take too long a walk to get beyond the environment of the city, board a car. Get out into the country where there is a bit of nature in the rough. Look around you. See what beautiful, snow covered rocks, bushes, ferns, trees, vine covered stones capped with snow and ice, bits of rugged road, half frozen brooklets, and withal broad expanse of field, traced here and there with rustic fence lined with shrubbery and bunches of trees. What a wonder world lies before you! Here let me interrupt you a moment. You cannot possibly grasp everything there is in even one little detail of what lies before you, in one afternoon. Do not attempt it. Select one little spot. Let it be a tree, for instance, select one that is rugged, and gnarled and shows by its looks the battle it has fought for existence. If there happens to be a bit of shrubbery bordered wall, a section of weather-worn fence, or a heap of rock near its base, it will do no harm. A bit of variety often adds charm. But it is better not to have too many complications in the first lesson. Let simplicity be your motto.

Now as you look over your chosen subject what a volume of beauty lies open before you. This simple snow bedecked composition which you have perhaps passed time and again, with not so much as a single thought, while seeking for something to photograph. Now do not go away until you realize, at least a portion of what lies before you. I can assure you that it will be time well spent.

Study it, change your position a bit, and again study it. Notice that bit of bark which has started to peel from the tree trunk, how the dark shadow behind it brings it into bold relief, from one point; while from another position, just a little removed either to right or left, it is scarcely noticeable.

Do you notice how one side of the tree is in deep shadow, viewed from one point, while the other side is in high light? Then again, from another viewpoint it seems to be all about the same tint. Which is the most pleasing?

By this time the sun is getting low. If you have not brought your camera along, go home and think it over. And the next opportunity you have, take your camera with you, loaded with your usual plate or film. Take your tripod also under your arm, and again wend your way to the old tree. You should by this time feel acquainted—do you? Set up your camera, and make at least four—time exposures—of say one twenty-fifth second with F/16 stop, from as many different viewpoints. Go entirely around your subject. Go home:— Retire to your dark-room and proceed to develop your plates or film. Use your regular developer formula, but add an equal volume of water, and one or two drops of a ten per cent solution of bromide to each ounce. Be careful not to get your negatives too dense.

You know you have often made snow scenes in summer time, by under-exposure and too vigorous development. Now reverse the method, and give plenty of exposure, and follow with weak, well restrained development. Strive to show every detail in the darkest shadows of the old tree trunk, and at the same time every little inequality in the snow background. Have very little absolutely pure white paper in your print;

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and also about the same amount of deepest dark in the densest shadows. It requires time and patience, but one is well paid for his trouble. For it is certain that for beauty, delicacy of color, fine tracery, texture, and true tone values, a "Snow Scene" can not be excelled.

THE OLD MILL. A. L. HITCHIN.

Figure 2.
PRUNE BLOSSOM.
Illustrating article "Blossom Photography," by A. M. Sutton, M. D.

BLOSSOM PHOTOGRAPHY

By A. M. SUTTON, M.D.

PROBABLY it is impossible to reproduce, in monotone at all events, all the exquisite beauty of nature as exhibited in blossoming fruit trees, but it is certain that the majority of blossom pictures which we see are far from being as good as they might be made. My object in this little article is to indicate a few essential points which are absolutely necessary to even moderate success.

First and foremost, it is well to avoid blossoms whose chief charm lies in color, and to choose those whose strong points are delicate detail of form and tendency to group in attractive masses. My favorites are cherry, prune, and apple, common almost anywhere. Another point is to avoid taking too much into the view; a single tree, or a single row in an orchard, makes a far more effective picture than an attempt to include the whole countryside. The popular idea of "a sea of blossom" is grand to the eye, but loses immeasurably when reduced upon a 4 x 5 plate.

The ideal combination for a blossom picture would be to have the blossom exactly at the right stage against a back-

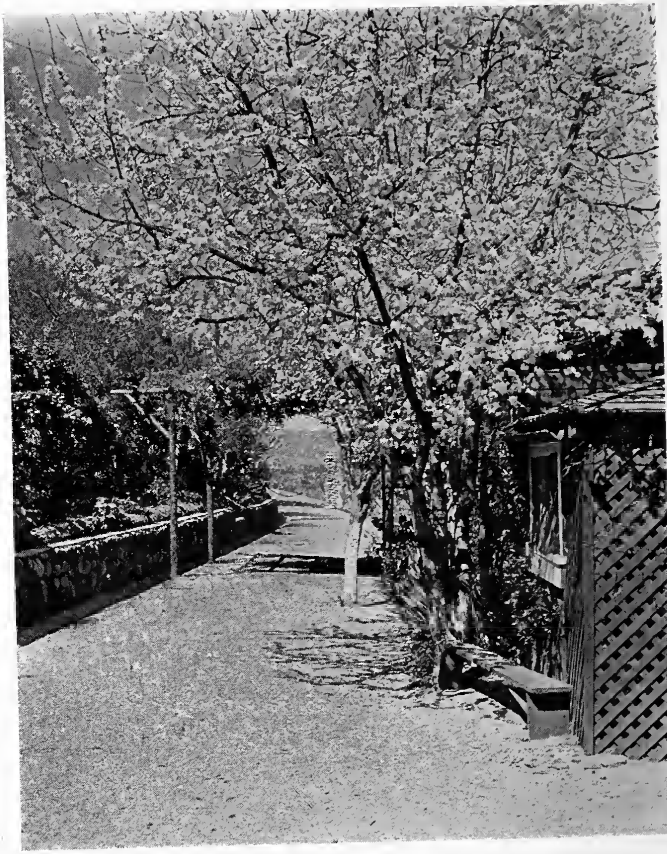


Figure 1.
THE CHERRY TREE IN THE YARD.

ground of dark gray clouds, and a strong cross lighting of brilliant sunshine on a windless day. I have never met with such a combination; one or other of the conditions has always been lacking, and the chances are very much against the seeker after perfection, as usual.

The background or setting is important. Often a hillside or a mass of dark foliage can be utilized in part, but some portion of the subject will inevitably stand out against the sky, and if no precaution is used be swallowed up in the brilliant blue. So the use of a four or five times color screen is absolutely necessary to darken the sky. Hence the importance of a calm day, in view of the comparatively long exposures needed.

Correct exposure is a necessity, rather full than scanty. My own experience is that for all work out in the open a reliable exposure table, such as that published by American Photography, is to be preferred to a meter using sensitive paper. I always carry a meter, and deem it invaluable for work in shadow, especially in deep shade. But out under the broad skylight my eye is not quick enough to accurately time the rapidly darkening paper, and I get better results from the use of the tables.

AN ORCHARD HOME. Figure 3.

At all events, exposure should be full, and development carefully timed so as not to block the delicate high lights, and aiming at a rather thin negative full of detail. Generally a soft slow printing paper of the portrait class, with semi matte surface, will be found to give the best results.

My illustrations were made in California in the month of March with a 4 x 5 plate camera, Vinco anastigmat with four times color screen, upon Defender D. C. ortho plates, and prints made on Argotone.

Figure 1. "The cherry tree in the yard" shows the use of the

color screen in bringing out the blossom against a cloudless blue sky. Data, 10.30 a. m., bright sun shining across the view. F/22. 3 sec.

In Figure 2, "Prune blossom," advantage was taken as far as possible of the hill and dark trees in the background to afford an effective setting. The upper part of the tree on the left would have been utterly lost on the sky without the color screen. Taken a few minutes after Figure 1. F/16. 2 sec.

Figure 3, "An orchard home," again shows the advantage of pressing into service dark foliage as a foil to the white blossom.

Figure 4, "In a cherry orchard," was taken with the sun dead ahead, at F/8, 5 sec. exposure. While a good deal of the detail on the blossom is lost, the general effect is to me not at all unpleasing.

I am not at all sure that reproduction will bring out in the illustrations the points I have tried to make clear in the text, but if not a few experiments in exposure next blossom time will, I think, remove any doubt upon the subject.

Figure 4.

IN A CHERRY ORCHARD.
Illustrating article "Blossom Photography," by A. M. Sutton, M.D.

ON THE OLD YORK ROAD—MARYLAND.
Blanche C. Hungerford.

THOUGHTS ON RECORD WORK

By J. E. ADNAMS

THE beauty of photography as a hobby is that it suits such a number of different tastes. It appeals to the fond father who wishes to take a portrait of his firstborn, to the tourist who wishes to show his friends at home the places he has seen, to the scientific man who wants to copy diagrams or specimens, to the artist who makes pictures, to the local historian who wishes to make records.

We are told by some people that the most useful records to make are those of the dress, manners and customs of the present day, because when we are gone they will be of great interest and value to the coming generation, and show them what people and things looked like in this present year of grace.

There is some force in the contention, but when we consider that our reason for taking up a hobby is primarily to please ourselves and only in the second place to please other people, this idea is not very alluring. "Familiarity breeds contempt," and we fail to see any interest in what are to us everyday occurrences.

A more interesting branch of record work is portraying old streets and buildings, bits of quaint picturesqueness which are now with us but which must inevitably disappear in the changes which are always taking place.

In England and Europe generally we have a certain advantage. We possess relics of the art of the Middle Ages in ruined abbeys, castles, etc., and almost every village in the country possesses interesting tit-bits in its parish church. But without going so far back as the Middle Ages there are many links with the past on both sides of the Atlantic, links which are bound sooner or later to be broken as time rolls on, and the growth of cities, or the advance of sanitary science, sweeps them away.

I was pleased and interested by an article in this *Annual* for last year by Mr. William H. Zerbe on "Picturesque New York," showing that there are plenty of interesting and picturesque subjects to be found in the more out-of-the-way places. And when I read the descriptions by such writers as Nathaniel Hawthorne in the "House of the Seven Gables" and Oliver Wendell Holmes in the "Guardian Angel," I feel convinced that even in a go-ahead country like America there must be many old spots—"back-waters"—in the stream of life where subjects may be found historically interesting and at the same time pictorial which will be well worth securing.

An instance of the kind of thing I mean is the accompanying illustration (Figure 1) of a quaint corner in the Old World fishing village of Robin Hood's Bay on the Yorkshire coast, a curious conglomeration of red roofed houses huddled together on a sloping cliff facing the North Sea with no streets, but only narrow cobbled footways wandering here and there and up and down among the houses, with a wider path than the others serving as a high street leading down to the seashore with its

> "Hard coils of cordage swarthy fishing nets,
> Anchors of rusty fluke, and boats updrawn."
>
> (Enoch Arden)

Before the advent of the railway about thirty years ago this little place was practically shut off from the rest of the world, as there is no direct road to the village, and in the old smuggling days the fish caught and the goods imported without paying duty were carried across the open moors to other places on horseback and exchanged for luxuries and necessaries. Contact with the outer world is already altering the character of the place. It is beginning to be sought out by visitors and will in time perhaps become a fashionable watering place, and then good-bye to its picturesqueness.

Figure 1.

A QUAINT CORNER.

Illustrating article "Thoughts on Record Work," by J. E. Adnams.

GROUND-GLASS AND GRAPHITE FOR MODIFYING COMPOSITION

By WILLIAM H. ZERBE

THE amateur photographer who practises the art seriously to attain pictorial results very often finds on his hands a negative that just misses being a good picture, owing to some defect in the negative itself, or in the composition. On account of the difficulty of retouching successfully on the film, it is laid aside, rather than chance spoiling the negative.

There is a method, however, of improving such negatives without taking the risk of spoiling the original negative. The method is not new, but is used very little by the amateur. The work of retouching is done on a separate piece of ground-glass instead of on the negative, using powdered graphite and a chamois stump. Figure 1 shows a print of an old mill at Bridgehampton, L. I. It is a negative which was made almost fifteen years ago, but because the composition was not as successful as it should be a print was never made from it until recently. Henry W. Poore in his "Pictorial Composition and the Critical Judgment of Pictures" says that a good landscape should not have two entrances to a picture. This picture is a splendid illustration to show how this advice holds good, as the two roads make two distinct entrances to the old mill. The one on the left could be dispensed with and improve the composition of the rest of the picture. Figure 2 shows the road worked out, and the sky improved. I feel sure that if attention were not called to it or comparison prints shown the hand work would never be noticed.

Thinking that others may have negatives which could be improved with similar treatment, I will explain the method used. A good contact negative is first made from the original negative; a piece of fine etched ground-glass is placed against the positive so that the film and matt side of the glass are on the outside. They are then bound with adhesive tape, and placed in a retouching frame or some other suitable holder,

A CHARACTER STUDY. WILLIAM H. ZERBE.

with the film side of the positive down and the ground-glass matt surface up. The frame is placed where the light will shine through from the back. Spread some graphite powder on a piece of card-board. Take an artist's leather stump and rub a little of the graphite on the end of it. Now rub it over the part which represents the road, which being light or nearly clear glass in the positive, it must be darkened to correspond with the surrounding part. Care must be taken to match the texture or design of the foliage. This may be done by stippling

Figure 1.

gently. If necessary, a pencil can be used for fine lines. I might also state that any part which does not suit may be rubbed off with a soft eraser. The upper corners were also darkened on the positive, and a suggestion of a sky worked in. This work being done on the positive, one is able to work better than on the negative. If the work has been done satisfactorily, which may be judged by making one or two trial prints (which will be negative prints) a contact or enlarged negative is made from the positive and retouched ground-glass, printing through the two at one time, using a slow process plate both for the positive and the new negative.

With different exposures and development, one can change the contrast of the original to a great extent. For instance, if the original negative is flat, with a short exposure and strong developer greater contrast can be had, which can be increased again in the same manner when the new negative is made, or if the original is a contrasty one a long exposure and weak developer will give softer results.

Figure 2.

With thin negatives a good many stunts can be done without making a positive, using the ground-glass as explained above, remembering that whatever you put on the ground-glass will show in a light tone according to the amount put on, for in this case you are working with the negative.

A number of ways to do this class of work have been recommended, such as flowing the back of the negative with matt varnish, painting it with starch paste and stretching unglazed onion skin paper over the back of the negative. I do not care for any of them as well as ground-glass, for any mistake in the drawing or the amount of graphite put on, it cannot very easily be removed, whereas if a mistake has been made on the ground-glass it can be washed off with a piece of wet cotton and then start all over again. There is quite a thickness between the film side and the matt side of the ground-glass. This is an advantage for it softens the edge of retouching. One or two extra pieces of clear glass may sometimes be used to advantage for softening the retouching, especially where clouds are worked in. Films may be worked the same way by binding the film to the ground-glass, but in most cases the film will be small, and the retouching will be outlined too sharply, so it is advisable to use an extra piece of clear glass to make the distance greater between the film and ground-glass, which will soften the hard lines of the retouching.

I could go on at length telling of the many things that could be done with ground-glass and graphite, and show illustrations, before and after treatment, but I am afraid that the Editor will cut down what I have already written.

Just give the method a trial. It costs little and no risk is run with any negative you try it on.

THE FIRST SNOW. EDWIN J. WHITE.

PHYSICAL AND CHEMICAL CHARACTERISTICS OF PHOTOGRAPHIC DEVELOPERS

(Analysis)

By Samuel Wein

The number of "organic compounds" used as photographic developers has increased to such a large extent, and the need of a summary of the general characteristic reaction of these substances led the writer to investigate these. His observations are given in routine form.

The developers reviewed in this paper are only those that have become popular and in use every day.

In making tests, the investigator is advised to do this in the systematic manner given: viz.:—commercial name; chemical name; constitution formula, crystalline formation, melting point, solubility, behavior to alkalies, acids, oxidizing agents, and milk enzymes.

The chief commercial developers may be classified into:—Paramidophenol, Diamidophenol, Methyl-paramidophenol, Methyl-orthoamidophenol, Pyrogallol, Pyrocatechin, Hydroquinone (and haloid substitution products) Monobrom or Chlor-hydro quinone.

Amido-hydrocarbons:—Paraphenylenediamine.

Naphthalene salts:—Eikonogen.

Complex amido acids:—Glycin.

Nearly all photographic developers give a more or less colored solution with raw milk that has not been heated above 75° C., in presence of hydrogen peroxide. This is due to the "enzymes" in the raw milk action as "carriers" of oxygen, and giving a coloration which is the result of oxidation. The enzymes are destroyed at a temperature above 75° C. Two developers (ortol and paraphenylenediamine) give such a decided reaction with raw milk that they can be used for detecting as little as 1 per cent. of raw milk in boiled milk. With boiled milk there is no immediate coloration; a little coloration is apt to occur later, but this is negligible. The reaction is prevented by caustic alkalies, and especially by the presence of a little sulphite or metabisulphite. In this case the sulphite must be decomposed by well boiling with a little hydrochloric acid and neutralizing. Metol, paramidophenol, pyrocatechin, and amidol give a more or less deep "cafe-au-lait" color with raw milk. Glycin, hydroquinone, adurol, and eikonogen give no immediate coloration with raw milk, but the milk becomes gradually of a pinkish or salmon tint. There is no coloration with boiled milk in a similar time. Pyrogallol gives an immediate brownish-yellow.

Some developers yield on oxidation with acid-bichromate a quinone, which is usually a deep yellow, not very soluble, volatile substance, with an odor which is very characteristic and pungent, especially when the solution is boiled. Other developers yield no quinone. Adurol produces a chloro- or bromo-quinone, but the smell is similar to that of ordinary quinone. In order to determine whether the solid developing substance is a simple developer or not, test for the presence of sulphite and carbonate. Carbonate, however, is not likely to be found. If sulphite is present, decompose it by heating with hydrogen peroxide and well boiling to expel sulphur dioxide, then neutralize with sodium carbonate. The resulting solution will contain the developer together with a little sulphate and chloride, which will only interfere with the solubility and lead acetate tests. The solution may then be examined by the system described below. After the presence of certain developers has inferred they may be isolated with suitable solvents and confirmed. If sulphite and carbonate are absent, recrystallize a little of the substance on a slide and examine microscopically to see if the crystals are all similar or not. If different crystalline substances are noticed, try the effect of solvents on the mixture, and submit the residues to examination by the system described below. It is as well to remember that there are crystalline combinations (weak chemical compounds) of such substances as metol and hydroquinone, but they are readily decomposed when boiled with water in the presence of a little acid or alkali. If the developer is in the liquid form sulphite is always present.

In performing the ferric chloride test Liquor Ferri Perchloridi should be used. If a very dilute ferric solution is used the developer will be in excess, and, being a powerful reducer, will reduce the ferric salt to the ferrous condition, so that the reactions with a ferrous salt are obtained. For instance, pyrocatechin gives two different reactions according as the ferric chloride is in deficiency or excess.

Note.—The word "developer" is restricted to the active reducing agent.

Developers Yielding a Quinone with Acid-Bichromate.

Note.—If there is any doubt as to the presence of quinone on heating the substance with acid-bichromate solution, drop one or two crystals of hydroquinone into the boiling mixture, and the odor of quinone will at once be evident for comparison.

To the neutral or slightly acid concentrated solution of the developer add a few drops of caustic soda solution. A crystalline precipitate soluble in excess indicates paramidophenol (deep violet on solution in alkali) or glycin (no color on solution in alkali).

Caustic soda gives no precipitate. This indicates either metol, hydroquinone, or adurol.

Note.—If the solution is extremely concentrated or saturated with sodium chloride the base of metol is apt to be precipitated, but the crystals are flocculent and not glistening like paramidophenol or glycin. They readily dissolve on adding a few drops of water.

(a) The substance gives a nitrogenous odor when heated in a sublimation tube, and is not shaken out by ether from an acid solution. This indicates metol.

(b) The substance sublimes and gives no nitrogenous odor in a sublimation tube; it is readily shaken out by ether from an acid solution. This indicates hydroquinone or adurol.

It is necessary to confirm each developer by the following characters and tests. They are given rather fully because it is only by a careful study of all its properties that a simple developer can be separated from a complex mixture.

Developers Yielding No Quinone.

To the neutral or alkaline solution add some dilute hydrochloric acid a crystalline precipitate (a) insoluble in excess of hydrochloric acid indicates eikonogen (insoluble acid).

To a 1 per cent. solution of the developer in water acidified with hydrochloric acid add 6 per cent. of sodium chloride.

A 1 per cent. solution treated as above gives no crystalline precipitate. The developer in solution may be diamidophenol, methylorthoamidophenol, pyrocatechin, or pyrogallol. N.B.—Diamidophenol, hydrochlorides are precipitated in fine crystals on nearly saturating with sodium chloride, or in presence of excess of concentrated hydrochloric acid.

Separation of Complex Developers.

Developers suspected to contain two or more simple developers may be separated to a certain extent by the following system:—When a single developer has been isolated and fully separated, the addition of a little sodium peroxide to the residual liquid will tell whether there is another developer present in quantity or not. A considerable darkening or coloration will occur if there is a developer present.

If the developer occurs as a solution it will be found a safe plan to concentrate an acidified portion on the water-bath before proceeding to separate the mixture. When a crystalline precipitate has been found in any stage of separation it must be all removed as far as possible before proceeding to the next step.

If a solid, a somewhat concentrated solution should be made with the aid of a little acid or alkali, if necessary.

Step 1.—To the neutral or slightly alkaline, somewhat concentrated solution add some hydrochloric acid, drop by drop, stirring, cooling, and observing carefully. This separates as a precipitate. (a) The free acid of eikonogen (insoluble in excess); (b) the free acid, glycin.

Step 2.—To a fresh portion of the original somewhat concentrated solution (if no precipitate in step 1) or the neutralized filtrate from step 1 (if there was a precipitate) add sodium carbonate solution, drop by drop. A crystalline precipitate, insoluble in excess, but soluble in caustic soda, indicates paramidophenol.

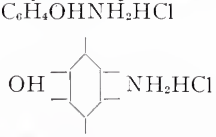
Step 3.—If no precipitate to the acidified solution or filtrate from Step 1 add 6 to 7 per cent. of sodium chloride. This separates in fine needles the free acid of diogen.

Step 4.—Shake out the acid solution or filtrate from Step 3 repeatedly with ether, adding a little chloroform to remove the ether in solution. The ether removes (a) hydroquinone, (b) adurol, (c) pyrogallol, and (d) pyrocatechin.

Step 5.—If no residue, take a fresh portion of the original liquid or aqueous liquid from Step 4; acidify, if necessary, with hydrochloric acid, and evaporate to dryness on the water-bath. The residue consists of the developer, together with some chloride and sulphate, which do not interfere with examination by color reactions. The residue may contain (a) amidol, (b) metol, (c) methylorthoamidophenol.

Paramidophenol-hydrochloride

$C_6H_4OHNH_2HCl$



Comes in the form of white crystals or plates.

Heated on platinum foil it chars without fusing and emits an extremely sharp odor of phenol. The free base melts at 154° C. with decomposition.

Readily soluble in cold water and in alcohol, insoluble in ether and chloroform. The free base is soluble in caustic alkalies and to the extent of about 1 part in 90 parts of water.

On adding alkaline sulphites and carbonates to a solution of paramidophenol hydrochloride, a mass of minute glistening crystals is precipitated (the free base). On further adding the alkaline salts in excess the base redissolves and forms sodium paramidophenolate. On adding a solution of potassium hydroxide to a concentrated solution of paramidophenol hydrochloride, the crystalline base is precipitated as above, but dissolves in excess of potassium hydroxide with a deep violet coloration. This violet coloration is an alkaline solution of the black insoluble oxidation product of the base. On adding a little alcohol they dissolve with a deep violet coloration.

Is precipitated from aqueous solutions by concentrated hydrochloric acid.

If a solution of paramidophenol hydrochloride be acidulated (hydrochloric or sulphuric acid), and some nitrite solution added till the smell of nitrous acid is recognized, a diazo compound is formed in the solution which, with Andresen's a-naphthol-disulphonic acid, gives, in caustic alkaline solutions, a poncean red dye.

If a solution of chlorinated lime is added to a paramidophenol hydrochlorine solution acidulated with hydrochloric acid gives at first a violet coloration. On adding more it produces a precipitate of yellowish-white flakes or flocks of chloramide quinone separate out. (N.B.:—Not given by a mere trace; it requires a fair amount to give the reaction well.)

Ferrous sulphate gives no coloration; ferric chloride gives a fine violet coloration, becoming red. (N.B.:—Not given by a trace, especially if the ferric chloride is in excess. Solution must be moderately strong to show the reaction well. This violet color is then permanent almost to the boiling point of water.)

To 10 C.C. of raw milk add about 0.05 grm. of paramidophenol hydrochloride dissolved in a little recently boiled and cooled distilled water, and then add 1 drop of hydrogen peroxide (20 volumes); a pale "cafe-au-lait" color is produced. Boiled milk gives no coloration under similar conditions.

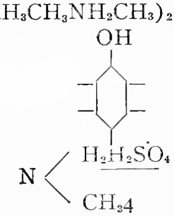
Metol

Mono-methyl-paramidophenol-sulphate.

$2C_6H_4(OH)NH_2(CH_3)H_2SO_4$

Methyl-paramido-meta-cresol-sulphate.

$(C_6H_3CH_3NH_2CH_3)_2(H_2SO_4)$



Buff colored acicular crystals.

Heated in a sublimation tube, it swells up and chars without fusion. It emits an objectionable nitrogenous odor (like burning bones) and whitish fumes. It gives a mixture of whitish and tarry sublimates. The free base melting at 87° C. The metol itself melts at 245 and 257° C.

Very soluble in hot water, insoluble (or very sparingly soluble) in alcohol, ether and chloroform. The free base is, however, soluble in organic solvents.

The solution boiled with some concentrated solution of caustic soda gives practically no coloration, but emits a nauseous odor (resembling that of phenyl isonitrile). If the solution is made alkaline with caustic soda, the base is liberated, but remains in solution, unless the solution is very strong. On agitating with ether (the ether does not change the oxidation coloring matter) and evaporating the ether on a watch glass, the base remains as oily drops, which soon set to a mass of interlacing acicular or rosette shaped crystals.

By adding some caustic soda to its aqueous solution and then dropping in some dilute sulphuric acid, while immersed in ice cold water, there is precipitated a mass of extremely fine felt-like needles. Note:—This is a nitroso derivative of metol. The metol solution must not be too dilute, and the precipitate only appears after standing a few minutes cooling and shaking.

Solution of chlorinated lime gives no precipitate, but the solution slowly becomes a fine purple-violet in color (distinction from paraphenylenediamine).

Ferrous sulphate gives no coloration. Very dilute ferric chloride gives very slowly a violet coloration, in excess it gives a deep brown (quinone) on warming. (Distinction from paraphenylenediamine).

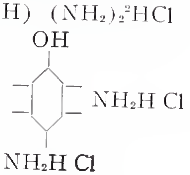
The fact that metol yields a quinone shows that it is a derivative of phenol, and not of cresol as stated by some authorities.

10 c. c. of raw milk treated with 0.05 grams of metol and adding recently boiled and cooled water (distilled) and further adding one drop hydrogen peroxide (20 volumes) gives a dark "cafe-au-lait" coloration. Boiled milk gives no coloration.

Amidol

Diamidophenol-hydrochloride

$C_6H_3(OH)\ (NH_2)_2{}^2HCl$



A crystalline colorless needle, usually resembling powdered magnesium.

Heated it chars without fusion, with a nitrogenous odor combined with the sharp odor of the hydrochloric acid. It gives a grey and black sublimate.

Very soluble in cold water, the solution soon becoming discolored, and forming a black insoluble powder. The acqueous solution has a characteristic acid reaction.

On adding a few drops of concentrated solution of sodium hydroxide to the solution contained in a white porcelain basin, it becomes rapidly a deep reddish-brown in color. Sodium carbonate added to a dilute acqueous solution, produces a fine blue coloration (distinction triamidophenal). The blue becomes red and vice-versa., according to the dilution, etc.

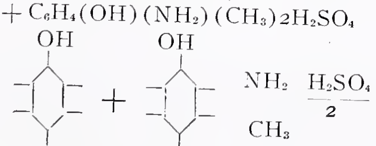
Ferric chloride gives an intense blood-red color, becoming violet-red on dilution with a large quantity of water. Ferrous sulphate gives no coloration.

Ortol

Methyl-ortho-amidophenol-sulphate + Hydroquinone

(A molecular mixture).

$C_6H_4(OH)_2 + C_6H_4(OH)(NH_2)(CH_3)2H_2SO_4$



In fine flat rhombic crystals or prisms becoming discolored on exposure to light and the air.

Heated it chars without fusion, giving a tarry sublimate and an offensive nitrogenous odor (like stale cabbage). The latter odor is partly due to decomposition of the sulphate. The tarry sublimate ultimately crystallizes in radiating clusters. The free base melts at 80° C. with decomposition.

Very soluble in water, particularly soluble in alcohol and ether (hydroquinone dissolves).

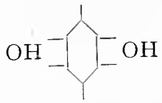
On adding a few drops of a concentrated solution of caustic soda, the solution becomes very slowly pale-brownish. On heating the solution it emits an odor of burning proterid. On adding caustic soda the free base remains in solution unless the solution is very strong. It may be "salted out" of solution. Note:—The oxidation coloring matter is soluble in ether (compare with metol).

Ferrous sulphate gives no coloration; ferric chloride gives a deep red color.

To 10 c.c. of raw milk add about 1 c.c. of a 1 per cent. solution of ortol, dissolved in recently boiled and cooled distilled water, and then add 1 drop of hydrogen peroxide (20 volumes), gives a deep brick-red coloration (Saul's test for raw milk). Boiled milk gives no coloration.

HYDROQUINONE; PARA-DI-OXY-BENZOL

$C_6H_4(OH)_2$



In long prisms or hexagonal needles of the ortho-rhombic system. Yellowish-white in color with no taste or odor.

Melts at 169° C. to a colorless liquid and sublimes in white fumes, leaving no residue. Boiling at 285° C.

Soluble in 1 in 10 of water at 15° C.; more readily in hot water. Readily soluble in alcohol ether and benzene. Insoluble in chloroform.

Lead acetate gives no precipitate in moderately dilute solution (distinction from pyrogallol and pyrocatechin, a mere trace of which gives a precipitate with lead acetate).

0.05 grms. dissolved in about 7 C.C. of water and two drops of copper acetate added gives a deep yellow coloration.

Nitric acid transforms it into oxalic acid.

Dissolves without alteration in normal and acid sulphite solution from which it deposits as yellow crystals containing sulphurous acid.

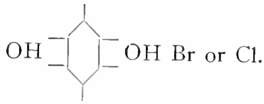
Not separated from alkaline solution by agitating with ether; it is, however, removed by acidifying.

Ferric chloride at first gives a green coloration (green compound of hydroquinone and quinone). The green solution becomes rapidly reddish-brown (quinone), and ultimately gives a brownish-yellow crystalline precipitate of quinone dissolving on adding a few drops of alcohol. Ferrous sulphate gives no coloration.

Add 1 part of concentrated sulphuric acid and 1 part potassium bichromate in 20 parts of water, by adding several drops of this solution to a hydroquinone solution on being heated, a pungent odor of quinone is obtained.

Adurol

Mono-brom-hydroquinone $C_6H_3(OH)Br$.
Mono-chlor-hydroquinone $C_6H_3(OH)Cl$.



Mono-brom-hydroquinone:—Leaflets.

Mono-chlor-hydroquinone:—White crystalline powder.

Mono-brom-hydroquinone melts at 111° C.

Mono-chlor-hydroquinone melts at 106° C.

(Distinction from hydroquinone). Both behave similar to hydroquinone on heating.

The brom and chlor products are readily soluble in water. Very soluble in alcohol and ether; slightly soluble in chloroform.

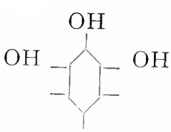
Ferric chloride gives a reaction similar to that given by hydroquinone. 0.05 mgr. dissolved in about 7 C.C. of water and two drops of copper acetate added gives a very pale-green coloration (distinction from hydroquinone).

Lead acetate reaction is the same as that given by hydroquinone.

Ultimate organic analysis (careful charring in presence of a small piece of sodium, acidifying with nitric acid, etc.) shows the presence of chlorine or bromine. This coupled with the fact that chloride or bromide is absent in the original substance, and the substance wholly sublimes, proves it to be a haloid derivative of hydroquinone.

Pyrogallol; Trioxybenzol

$C_6H_3(OH)_3$



In very light or fleecy white crystalline masses or dense needle shaped crystals.

Melts at 132° C. to a colorless liquid, which boils at 210° C. with white fumes, and at 250° C. it splits into meta gallic acid and water, leaving practically no residue.

Extremely soluble in 2½ parts cold water, 1 part alcohol and 1¼ parts of ether, with difficulty in benzene, chloroform and carbon disulphide.

The acqueous solution turns brown, then black in the air, depositing black flocks and evolving carbon dioxide. Acids prevent this decomposition.

In the presence of alkalies, pyrogallol rapidly absorbs oxygen, the solution becoming yellowish, then brown and lastly brown-black, especially on exposure, and the addition of caustic soda increases the reaction.

On adding lime water, the liquid assumes a fine red tint which turns brown.

Warmed with nitric acid in the presence of sulphuric acid, it gives a yellow solution, rapidly giving on dilution a yellow crystalline precipitate (picric acid.)

Pyrogallol is separated by ether from sulphite solutions, but not from sulphite and potash solutions.

The addition of 1 drop of Liquor Calcis Sacch to the solution produces an intense purple coloration, becoming gradually brown by oxidization.

Potassium permanganate decomposes it, liberating carbon dioxide with effervescence in concentrated solution. The potassium permanganate is discolored.

Heated with potassium permanganate and sulphuric acid, the solution cooled and shaken out with ether, gives, on evaporation of the ether, a residue of garnet-red crystals (purpurogalic acid). These crystals give a transient blue color with alkalies.

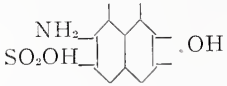
Heated with anhydrous phthalic acid and hot sulphuric acid, yields a staple green color or dye (coerulein).

The solution in recently boiled and cooled distilled water of a washed crystal of ferrous sulphate, added to a very dilute solution of pyrogallol in boiled distilled water, produces no coloration at first, but the solution becomes gradually a fine indigo blue. Ferric chloride gives a brownish-red coloration, gradually deepening and becoming dark brown on adding sodium carbonate.

Eikonogen

Sodium-a-amido-B-naphthol-monosulphonic acid

$C_{10}H_5(OH)(NH_2)(SONa)2H_2O$



In tabular crystals or rhombic plates white or slightly violet colored. Is sold in commerce with potassium metabisulphite which acts as a preservative as eikonogen oxidizes very readily in the air.

The free acid, dried and heated in a sublimation tube, chars without fusion, with a nitrogenous odor and also an odor of sulphur dioxide. It gives a tarry sublimate. When heated to 110° C., it loses 2½ molecules of water of crystallization.

The solubility in cold water is about 2 per cent., more soluble in boiling water, insoluble in alcohol, ether and chloroform. The free acid is soluble in boiling water, but insoluble in organic solvents.

Acids precipitate the free base in fine white needles from an aqueous solution of eikonogen, this precipitate is insoluble in excess of hydrochloric acid (distinction from glycine and diphenyl).

Alkaline solutions have a golden yellow color.

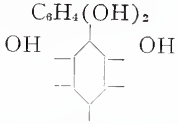
Ferrous sulphate (or very dilute ferric chloride) gives a fine violet color, becoming olive-green and finally reddish-yellow. Ferric chloride gives a reddish-yellow coloration. Note:—The presence of a small quantity of sulphite does not interfere.

On adding a 25 per cent. solution of a potassium salt to a saturated solution a glittering crystalline precipitate of potassium amido-B-naphthol-mono-sulphonate is thrown down. It is soluble in boiling water. A 15 per cent. sodium salt gives no crystalline precipitate. Note:—A 15 per cent. solution of a potassium salt will give a precipitate, but the reaction is not so evident, especially when the solution is colored by exposure.

10 c.c. of raw milk treated with 0.05 gms. of eikonogen dissolved in recently boiled and cooled distilled water, and then add 1 drop of (20 volumes) of hydrogen peroxide, gives no immediate coloration, but the solution becomes slowly salmon colored.

Pyrocatechin; Brenzcatechin; Kachin

$C_6H_4(OH)_2$



White broad flakes (from benzol), prismatic needles (from water).

Heated it melts at 104° C. to a colorless liquid, which sublimes in sharp aromatic vapors, leaving practically no residue.

Very soluble in water, alcohol, benzol and ether; sparingly soluble in chloroform.

Dilute acids do not affect it; gives practically no coloration when made alkaline with sodium carbonate solution, even when boiled (distinction from pyrogallol).

Can not be separated from an aqueous solution by shaking with ether in the presence of caustic alkalies. After acidulation of the solution is taken up by the ether.

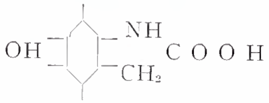
Solution of lead acetate causes a white precipitate with aqueous solution of pyrocatechin.

Liquor Calcis Sacch gives no coloration (distinction from pyrogallol).

Ferric chloride gives an emerald-green coloration. Ferrous sulphate gives a blue coloration exactly similar to that given with pyrogallol.

Glycine; Para-oxy-phenyl-amido-acetic acid

$C_6H_4(OH)(NH_2)(CH_2COOH)$



Micaceous plates.

Heated it melts and decomposes in whitish fumes with a disagreeable nitrogenous odor. The charred mass liquifies and swells up in the sublimation tube, and gives a crystalline sublimate.

Dissolves with difficulty in water (about 1 in 30), more soluble in boiling water (the solution not being discolored), crystallizing out on cooling in very glistening crystals. Practically insoluble in alcohol. Insoluble in ether, chloroform and acetic acid. The aqueous solution is strongly acid.

On adding a quantity in excess of its solubility to a little water, and then adding two or three drops of hydrochloric acid, the excess will dissolve readily. Then on carefully dropping sodium hydroxide solution until neutral, it is precipitated in glistening micaceous crystals. On adding a few drops of alkali in excess it redissolves. (Note: This is due to the fact that glycine, being an amido acid, is soluble both in acids and alkalies to form salts.)

An acidulated (with dilute sulphuric acid) glycine solution gives off the characteristic quinone odor with effervescence, on oxidation with potassium bichromate, with an evolution of carbon dioxide (test with lime water).

Solution of chlorinated lime added to an acidulated solution gives no crystalline precipitate.

Ferrous sulphate gives no coloration; ferric chloride has no action except a slight decoloration due to reduction.

To ten mils, of raw milk add about 0.05 grams of glycine dissolved in recently boiled and cooled distilled water, then add one drop hydrogen peroxide (20 volumes). No immediate coloration is produced. After a short time it gradually becomes a pinkish tint. Boiled milk gives no coloration.

American Annual Formulary

In the following section we have gathered together a typical collection of Formulæ and Tables, which will assist the photographer in his every-day work. It will be noticed that makers' formulæ are omitted. These can best be obtained by direct application to the makers. The appended formulæ are selected from the working methods of practical photographers.—Editor.

TRAY DEVELOPERS FOR PLATES AND PAPERS

Adurol—For Plates. No. 1.—Water, 10 ounces; sulphite of soda, 1¾ ounces; adurol, 85 grains.

No. 2.—Water, 10 ounces; potassium carbonate, 1¼ grains. For average outdoor exposures use equal quantities Nos. 1 and 2; for fully timed exposures take 1 ounce each of No. 1, No. 2 and water.

Amidol. A concentrated developer for plates.—Water, 13 ounces; sulphite of soda (crystals), 2½ ounces; when dissolved add amidol, ¼ ounce. The solution keeps fairly well in bottles completely full and well corked. For use take 1 ounce of the concentrated solution and dilute with 3 or 4 ounces of water.

Amidol. For gaslight papers.—An excellent developer for those subject to metol poisoning. (V. Serin.) Amidol, 60 grains; sulphite of soda crystals, 650 grains; potassium bromide, 10 grains; water, 20 ounces. Will keep only three or four days. Time of development about ½ minute.

Duratol-Hydroquinone—Universal Developer (M. D. Miller).—Hot water, 16 to 32 ounces; duratol, 15 grains. Dissolve and add, previously well mixed in the dry state, sulphite of soda, anhydrous, 440 grains; carbonate of soda, anhydrous, 660 grains. When dissolved, add hydroquinone, 60 grains. Add water to make 40 ounces. Use undiluted for contrasty gaslight papers. Dilute with an equal part of water for soft gaslight and bromide papers, plates, and films. For tank development of 65° Fahr. Dilute 1 to 1 and develop 12 to 15 minutes. Dilute 1 to 2 and develop 16 to 22 minutes. Dilute 1 to 3 and develop 26 to 34 minutes. Developer without bromide gives blue-black tones; small quantities of bromide give pure black; larger amounts, warm blacks.

Edinol-Hydro—For Panchromatic Plates.—Water, 30 ounces, edinol, 120 grains; hydroquinone, 120 grains; sulphite of soda (dry), 768 grains; carbonate potassium, 1344 grains; 10 per cent. bromide potassium solution, 1 dram; 10 per cent. oxalic acid solution, 1 dram. For tank use 1 ounce of above to 15 ounces water; temperature, 65 degrees; time, 15 minutes. For tray use 1 ounce above to 4 ounces water.

Edinol-Hydro Developer—For Plates and Papers (W. S. Davis).—Water, 8 ounces; edinol, 10 grains; hydrochinon, 15 grains; sulphite of soda (dry), 100 grains; carbonate of soda (dry), 150 grains. May be used full strength for gaslight paper, also for plates and bromide paper if desired. (Normal time of development at 60-65 degrees Fahr. Two minutes for plates.) Time of development is increased in proportion to amount of water added.

Eikonogen.—An excellent developer for under-exposed portrait negatives. (B. H. Allbee.) Eikonogen, 125 grains; sulphite of soda (dry), 125 grains; carbonate of soda (dry), 125 grains; bromide of potassium, 2 grains; water, 10 ounces. For softer effects add up to an equal volume of water. The image appears quickly and builds up fast.

Glycin-Metol—For Plates (*M. D. Miller*).—Water, 20 ounces; metol, 60 grains; sulphite of soda, anhydrous, 240 grains; carbonate of soda, anhydrous, 440 grains; glycin, 120 grains. Dilute with an equal volume of water. Wash plate thoroughly before fixing to prevent indelible yellow stain.

Hydrochinon.—For over-exposure plates to obtain contrasty negatives (B. H. Allbee). No. 1, water, 8 ounces; sulphite of soda (dry), ½ ounce; hydrochinon, 80 grains. No. 2, water, 8 ounces; carbonate of soda (dry), 1 ounce; potassium bromide, 40 grains. Take equal parts of No. 1 and No. 2. Temperature, 70 degrees.

Metol (*H. W. Hales*).—Metol, 60 grains; warm water, 16 ounces; sulphite of soda crystals, 1 ounce; carbonate of soda crystals, 1 ounce. Dissolve metol in warm water, then add the sulphite and carbonate in order named. Cool. Can be used repeatedly. For developing papers add a few drops of 10 per cent. solution of bromide of potassium.

Metol-Hydroquinone for Orthochromatic Plates.—Water, 20 ounces; metol, 14 grains; potassium metabisulphite, 18 grains; hydroquinone, 56 grains; sulphite of soda, 1 ounce; carbonate of soda, 1¾ ounces. Use 1 drop of a 10 per cent. potassium bromide solution to each ounce only if necessary.

Metol-Hydro-Eiko—For Double-coated Ortho Plates (*H. S. Hood*).—Water, 15 ounces; metol, 24 grains; hydroquinone, 24 grains; eikonogen, 24 grains; sulphite of soda (dry), ½ grain; carbonate of soda (dry), 320 grains; potassium bromide (10 per cent. solution), 4 drops.

Metol-Hydro-Eikonogen—For Plates (*Hood*).—Water, 150 ounces; metol, ½ ounce; hydroquinone, ½ ounce; sulphite of soda (dry), 5½ ounces; carbonate of soda (dry), 6 ounces. This can be kept in a hard rubber tank for five days before exhausted by oxidation.

Pyro—For Overtimed Plates (*J. D. Elliott*).—Sulphite of soda, 40° solution, 4 ounces; water, 4 ounces; pyro, 10 grains. Immerse plates in this solution for 20 minutes in the dark; then add to above solution ½ drachm carbonate of soda, 20° solution. When image appears add one more drachm of the carbonate of soda solution.

Pyro—For Plates (*J. D. Elliott*).—Sulphite of soda, 40° solution, 4 ounces; carbonate of soda, 20° solution, 4 ounces; pyro, 10 grains.

Pyro-Metol—For Plates (*H. M. Long*).

A—Water, 22½ ounces; metabisulphite, 2 drams; metol, 60 grains; pyro, 1 ounce. B—Water, 16 ounces; sulphite of soda, 2 ounces. C—Water, 16 ounces; carbonate of soda, 1 ounce. Normally used 1 ounce of each stock to 16 of water.

Pyro Soda—For Plates (*Mellen*). No. 1.—Water, 20 ounces; sulphite of soda (crystals), 4 ounces; carbonate of soda, 2 ounces. Dissolve the sulphite first and then add the carbonate.

No. 2.—Water, 6 ounces; pyro, 1 ounce. For correct exposures take 1 dram of No. 2; 1 ounce of No. 1, and add 2 ounces of water. For snapshots, or plates thought to be under-exposed, use 1 dram of No. 2; 1½ drams of No. 1, and 6 ounces of water. For over-exposure take 2 drams of No. 2, 1 ounce of No. 1 and 6 ounces of water. Or, instead of the 2 drams of No. 2 in this solution use 1 dram of No. 2 and 10 drops of a 10 per cent. solution of potassium bromide.

Pyro-Metol-Acetone—For Plates (*Cramer*). No. 1.—Water, 60 ounces; metol, 1 ounce; citric acid, 40 grains; pyro, 1 ounce; sulphite of soda (dry), 6 ounces.

No. 2.—Water, 48 ounces; liquid acetone, 12 ounces. For plates take 1 ounce No. 1, 1 ounce No. 2, water 5 ounces. For tank take 1 ounce No. 1, 1 ounce No. 2; water, 13 ounces.

TANK DEVELOPERS FOR NEGATIVES

Adurol (Montgomery).—Water, 20 ounces; sulphite of soda (anhydrous), 220 grains; carbonate of soda (anhydrous), 220 grains; adurol, 45 grains. For use take 1 ounce of above to 4 ounces water; add 2 drops 10 per cent. bromide solution; temperature, 65 degrees; time, 25 minutes.

Glycin (Montgomery).—Water (hot), 8 ounces; sulphite of soda (anhydrous), 50 grains; carbonate of soda (anhydrous), 240 grains; glycin, 45 grains. For use take 3 ounces of above and 37 ounces water; temperature, 65 degrees; time, 25 minutes.

Metal-Hydro (Frew).—Water, 12 ounces; metol, 7½ grains; sulphite of soda (anhydrous), 274 grains; hydroquinone, 30 grains; carbonate of soda (anhydrous), 150 grains; bromide of potassium, 2 grains. For use to each ounce of above add 4 ounces of water; temperature, 65 degrees; time, 12 minutes.

Ortol (Smith).—Water, 60 ounces; metabisulphite of potassium, 15 grains, sulphite of soda (anhydrous), 100 grains; carbonate of soda (anhydrous), 100 grains; ortol, 30 grains; temperature, 65 degrees; time, 20 minutes.

Rodinal (Agfa).—Water, 60 ounces; rodinal, 1 ounce; temperature, 65 degrees; time, 25 minutes.

DEVELOPERS FOR LANTERN SLIDES

Hydroquinone (B. H. Allbee).—No. 1.—Hydroquinone, 150 grains; metabisulphite potash, 10 grains; bromide potassium, 50 grains; water, 20 ounces.

No. 2.—Sulphite of soda (dry), 1 ounce; caustic soda, 100 grains; water, 20 ounces. Take equal parts of No. 1 and No. 2.

Hydroquinone—For Colder Tones (B. H. Allbee). No. 1—Hydroquinone, 60 grains; sulphite of soda (dry), 1 ounce; citric acid, 10 grains; bromide potassium, 10 grains; water, 10 ounces.

No. 2.—Carbonate of soda (dry), 1 ounce; water, 10 ounces. Use equal parts.

FIXING BATHS AND HARDENERS

Acid Fixing Bath (Carbutt).—Sulphuric acid, 1 dram; sodium hyposulphite, 16 ounces; sulphite of soda, 2 ounces; chrome alum, 1 ounce; warm water, 64 ounces. To prepare the bath, dissolve the hypo in 48 ounces of water; the sulphite of soda in 6 ounces; mix the sulphuric acid with 2 ounces of the water and pour slowly into the sulphite solution, and then add to the hypo solution. Dissolve the chrome alum in 8 ounces of water; add to the bulk of the solution and the bath is ready for use.

Acid Fixing Bath (M. D. Miller).—Hypo, 8 ounces; water, 1 quart; Lumiere's sodium bisulphite lye, 1 to 2 ounces, to which may be added, if greater hardening is desired, powdered alum, 220 grains.

Fixing Bath for Lantern Slides (B. H. Allbee).—Sulphuric acid, 1 dram, hypo, 16 ounces; sulphite of soda (dry), 1 ounce; chrome alum, 1 ounce; water, 64 ounces.

Plain Fixing Bath.—Dissolve 1 pound of sodium hyposulphite in 2 quarts of water or 4 ounces of the hypo in a pint of water, according to the bulk of the solution required.

Hardener for Fixing Bath (Beach).—Water, 40 ounces; sulphite of soda (crystals), 6 ounces; powdered alum, 16 ounces; acetic acid, 40 ounces. Add in the order given and shake well until dissolved. Of the above add 16 ounces to each gallon of hyposulphite of soda solution, testing 70 to 80 degrees.

Hardening Negatives.—Immerse them for a few minutes in formalin, 1 ounce; water, 30 ounces.

INTENSIFICATION

Intensifier, One Solution (F. M. Steadman). No. 1.—Bicholride of mercury, ½ ounce; water, 10 ounces. No. 2.—Iodide of potassium, 5 drams; water, 1½ ounces. Add to No. 1. No. 3.—Hyposulphite of soda, 1 ounce; water, 2½ ounces. Add to the previous mixture. This clears the solution when it is ready for use for local intensification. For tray intensification add more water to slow its action.

Intensifying with Red Ink (E. M. Cohen).—Soak the negative well. Put teaspoon of red ink into tray of water and rock until mixed. Immerse negatives face up till well and evenly colored, then without washing put in drying frame. If left in solution too long will be over dense, in which case several trays of clear water will eliminate some of the color.

The intensification is permanent without the danger of negative going bad, as is the case when mercury is used.

Intensifier—Mercurie Chloride Proeess. No. 1.—Mercuric chloride, 200 grains; bromide of potassium, 120 grains; water, 6½ ounces.

No. 2.—Sulphite of soda, 1 ounce; water, 4 ounces. The well-washed negative, free from hypo, must be thoroughly bleached in No. 1; well washed; and then blackened in No. 2. After blackening it is well washed again.

REDUCTION

Reducer, Single Solution (F. M. Steadman).—Red prussiate of potash, size of pea; hyposulphite of soda, six times that volume; water, 6 ounces (for local reduction 1½ ounces). When reduced wash thoroughly.

Reducer — Ammonium Persulphate. — Ammonium persulphate, 15 grains; water, 1 ounce. The solution should be made just before use. The negative must be perfectly free from hypo or it will be stained by the persulphate. When the desired reduction has been reached, transfer the negative without washing to a 10 per cent. solution of anhydrous sodium sulphite. Wash finally for 15 or 20 minutes.

Redueer—Farmer's.—Dissolve 1 ounce of potassium ferricyanide in 9 ounces of water and make up to 10 ounces, forming a 10 per cent. solution. Label this poison. Thoroughly wet the negative to be reduced. Take enough fresh plain hypo fixing bath for the purpose, and add to it enough of the ferricyanide solution to make it a light straw color. The negative to be reduced is immersed in this solution, when it will be seen to lose density. Rock the tray to insure evenness of action. This reducer can also be used for local treatment.

PRINTING PROCESSES

Blue Prints

Blue Printing Sensitizing Formulæ (Brown). A.—Dissolve 110 grains ferric ammonium citrate (green) in 1 ounce of water.

B.—Dissolve 40 grains of potassium ferricyanide in 1 ounce of water. These two solutions are made up separately. They are then mixed together and kept in a stoneware bottle, but the single solution should always be filtered before use. The mixture will retain its good qualities for months if kept from the light.

(Millen).—Potassium ferricyanide, 1 ounce; ammonio-citrate of iron, 1½ ounces; distilled water, 10 ounces. Mix thoroughly and filter. The solution should have a deep wine color and dry on the paper a

lemon-yellow. If the solution is green and has a precipitate, the ammonio-citrate is old and spoiled. The mixture should be kept from the light.

Bromide Paper

Bromide Paper Developers: Hydroquinone-metol. No. 1.—Water, 10 ounces; hydroquinone, 52 grains; potassium metabisulphite, 18 grains; sulphite of soda, 5 drams; carbonate of soda, 1¼ ounces.

No. 2.—Water, 10 ounces; metol, 30 grains; carbonate of soda, 5 drams; sulphite of soda, 5 drams. One or two drops of a potassium bromide 10 per cent. solution added to 1 ounce of the mixed developer will increase contrast and keep the whites pure. Equal parts of 1 and 2 give excellent prints from a normal negative; one part of 1 and two of 2 give gray prints with maximum half-tone and gradation; two parts of 1 and one of 2 give vigorous prints from soft delicate negatives.

Amidol for rich blacks (freshly prepared). Distilled (or boiled) water, 4 ounces; sulphite of soda (crystals), 90 drams; amidol, 10 to 15 grains. Add a drop of 10 per cent. bromide solution to each ounce of developer.

Sepia Tones: Hypo Alum.—Hyposulphite of soda, 5 ounces; ground alum, 1 ounce; boiling water, 70 ounces. Dissolve the hypo in the water, and then add the alum slowly. A milk-white solution results which should be decanted when clear. It is not used until cold (about 60° Fahr.).

Sepia Tones: Sulphide of Sodium.—The fixed and washed print is treated with one of the following solutions: (1) Potassium ferricyanide, 10 grains; potassium bromide, 10 grains; water, 1 ounce; or (2) potassium ferricyanide, 20 grains; sodium chloride (common salt), 30 grains; water, 1 ounce. The image will be bleached by either of these solutions in a few minutes, the whitish appearance of the deposit being caused by its change into a salt of silver. After 5 minutes in running water apply the sulphuretting solution: Dissolve 3 ounces of sodium monosulphide in 15 ounces of water; boil the solution for about 10 minutes, filter off the black precipitate formed, and when cooled make up to 25 ounces with water. To tone take of the sulphide solution 1 ounce and add water 12 to 20 ounces.

Red Tones: Copper.—Dissolve 100 grains of ammonium carbonate in 2 ounces of water, and in this solution dissolve 10 grains of sulphate of copper. Then add 20 grains of potassium ferricyanide. A clear, dark green solution results which gives a red-chalk tone in about 3 minutes. Tone until the deepest shadow is converted, and then wash the print for 10 minutes.

Green Tones: Vanadium.—Bleach print in the following: Potassium ferricyanide, 10 grains; ammonium carbonate, 100 grains; water, 1 ounce. Wash well and apply: Ferric chloride, 2 grains; vanadium chloride, 2 grains; ammonium chloride, 4 grains; hydrochloric acid, 5 minims; water, 1 ounce.

Blue Tones: Iron.—Bleach print in: Potassium ferricyanide, 10 grains; ammonium carbonate, 100 grains; water, 1 ounce; then tone in ferric chloride, 5 grains; hydrochloric acid, 5 minims; water, 1 ounce.

To prevent blistering on bromide paper (P. L. Anderson).—Immerse after fixing and before washing from 10 to 15 minutes in water, 10 ounces; formaldehyde, 1 ounce. A 10 per cent. solution of chrome alum will do equally well.

To make bromide paper translucent (P. L. Anderson).—Lay the paper negative face down on a blotter and paint thinly with the following mixture. Give three coats. Turpentine, 3 ounces; powdered resin, 1 ounce; gum elemi, 1 ounce; paraffine wax, ½ ounce. Heat with stirring until it begins to boil. Allow to cool slightly and add turpentine, 3 ounces.

Carbon Tissue

Carbon Tissue, Sensitizer for (Bennett).—Potassium bichromate, 4 drams; citric acid, 1 dram; strong ammonia water, about 3 drams; water, 25 ounces; dissolve the bichromate and citric acid in hot water, and add sufficient ammonia to change the orange color of the solution to lemon-yellow. Sensitize for 90 seconds; reducing the water softens the gradation in the print; increasing it to 30 ounces gives more vigor.

Carbon Lantern Slides.—Prepare the glass by coating with the following preparation: 180 grains of Nelson's Gelatine No. 1, in 20 ounces water. Add 10 grains bichromate of potash. Dry and allow the plate to be exposed to light for a couple of days to make the coating thoroughly insoluble. Sensitizer for tissue: 1 per cent. to 1¼ per cent. solution of bichromate of potash. Immerse 2 minutes. Print deeply; expose twice as long as ordinary paper print. Develop in hot water as usual.

Gum Bichromate

Gum Bichromate (Casper Millar). A.—Gum arabic, 1¼ ounces; water, 3½ ounces; salicylic acid, 4 grains.

B.—Chrome alum, 45 grains; water, 3½ ounces. Grind A and B with water and pigment, brush over paper, dry and store.

Suggested formula.—A, 2 ounces; B, 1½ drams; carbon black, 10 grains; sensitize for 2 minutes in 5 per cent. bichromate solution.

Kallitype

Kallitype Sensitizer for Black Tones (J. Thomson).—Distilled water, 1 ounce; ferric oxalate (Merck's or Mallinckrodt's) 15 grains; citrate of iron and ammonia (brown scales), 25 grains; chloride of copper, 8 grains; oxalate of potassium, 35 grains; oxalic acid, 15 grains; silver nitrate, 15 grains; gum arabic, 10 grains. For greater contrast add 1 to 10 drops 5 per cent. bichromate of potassium solution.

Developer: Stock Solution.—Distilled water, 1 ounce; silver nitrate, 40 grains; citric acid, 10 grains; oxalic acid, 10 grains. Filter. Normal developer 1 dram stock solution and 7 drams of water.

Platinum Papers

Platinum Sensitizer (P. L. Anderson).—Stock solutions: I. Water, hot, distilled, 2 ounces; ferric oxalate, 240 grains; oxalic acid, 16 grains. II. Water, hot, distilled, 2 ounces; ferric oxalate, 240 grains; oxalic acid, 16 grains; potassium chlorate, 4 grains. III. Water, distilled, 19 drams; potassium chloroplatinite, 219 grains (=½ ounce). Keep in amber glass bottles or in the dark. For use take: I, 22 mm.; II, 0 mm.; III, 24 mm. Gives very soft prints. Or, I, 12 mm.; II, 10 mm.; III, 24 mm. Results about the same contrast as a P. O. P. print. Or, I, 0 mm.; II, 22 mm.; III, 24 mm. Gives extreme contrast.

Above quantities sufficient for a 10 x 12 sheet of ordinary paper. Very smooth requires less and very rough more, up to 25 per cent. additional. Apply with a soft fitch or camel-hair brush, allow to surface dry, and make bone-dry over a stove or gas-jet. Should dry in not less than five or more than ten minutes.

Platinum: Sensitizing Gold Bath and Sepia Papers. A.—Chloroplatinite of potassium, 15 grains; distilled water, 90 minims.

B.—Ferric oxalate, 21 grains; oxalic acid, 2 grains; distilled water, 183 minims. For cold bath paper, mix A and B, and add 15 minims of water. For sepia paper mix A and B and add 15 minims of a 5 per cent. solution of mercuric chloride. The addition of a few grains of potassium chlorate to any of the above gives increased contrast in the print. From 140 to 170 minims of solution are sufficient to coat a sheet of paper 20 x 26 inches.

Platinum Prints: to Intensify. A.—Sodium formate, 45 grains: water, 1 ounce.

B.—Platinum perchloride, 10 grains; water, 1 ounce.

C.—For use, take 15 minims each of A and B to 2 ounces of water Immerse prints until sufficiently intensified, then remove and wash.

Platinum Prints to Distinguish from Bromide.—Soak the print in saturated solution of mercuric chloride; a platinum print will not change; a bromide print will bleach.

Salted Papers

Salted Paper Prints: Sensitized with the following:—Silver, 480 grains Troy; water, 11 ounces. Dissolve and pour off 2 ounces, and to the 9 ounces left add strong aqua ammonia to form a precipitate and redissolve the precipitate, then add the remaining 2 ounces which will form another precipitate, to this add 9 drops of nitric acid C. P. Apply this to the paper with a tuft of cotton.

Any good Toning Bath will give good results, such as: Chloride aluminum, 80 grains; bi-carbonate soda, 360 grains; water, 48 ounces. When mixed this will form a flacky hydrate which will settle to the bottom. It can be strained through clean washed muslin. To prepare a small bath for toning, take 12 ounces of the stock solution and add sufficient gold to tone in 8 to 10 minutes. The gold solution must be neutralized with bi-carbonate soda before adding to the above bath. When the prints reach the desired tone throw them into a bath of salt water, made of water, 1 gallon; table salt, 1 ounce.

Printing Out Papers

Gold Toning (B. H. Allbee). No. 1, 10 per cent. solution sulphocyanide of potassium; No. 2, 15 grains chloride of gold in 7½ ounces of water; No. 3, 10 per cent. solution phosphate of soda; No. 4, saturated solution borax. Take No. 1, 1 dram, water, 8 drams; No. 2, 4 drams; No. 3, 1 dram; No. 4, 2 drams. In this put print in dry. Toning should be complete in two minutes. Wash as usual.

Gold Toning.—For blue-black tones, for slight strengthening, and for converting rusty black into pure black. Soak print in warm water, lay on warm glass, brush over glycerine and blot off. Pour on few minims of solution of gold chloride (1 grain per dram), and rapidly brush in all directions. When toned, rinse, and sponge back and front with: Metol, 50 grains; sodium sulphite, 1 ounce; potassium carbonate, ½ ounce; water, 20 ounces. Tone in daylight. Do not tone sepias or old prints in this solution.

MISCELLANEA

Adhesive for Labels.—Soak 1 part of the best glue in water until thoroughly swollen, add a little sugar candy, 1 part of gum arabic and 6 parts of water. Boil with constant stirring over a spirit lamp until the whole gets thin. Coat sheets of paper with it; let dry and cut up into convenient sizes.

Autochromes.—Sensitizing to get more speed (M. G. Lovelace).—In complete darkness bathe plates in the following solution: Distilled water, 66 cc.; ethyl alcohol pure 90 deg., 33 cc.; dye solution, 2 cc.; ammonia, .30 cc. The dye solution is a mixture of pinachrome, pina verdol and pinacyanol, 1 part of each in 1000 of alcohol. Bathe plates for five minutes and dry away from dust. These plates require a special filter the formula being: Hard gelatine, 3 gms.; distilled water, 100 cc.; filter yellow K, 1 per cent. solution 2.5 cc. Use 1 cc. to each 10 square centimeters of surface. These plates have about five times the speed and it is possible to make snap shots with them if a lens working at F/4.5 and F/5.6 is used.

Blacking Mixture.—Dissolve a 4-ounce stick of licorice in 8 ounces of water with the aid of gentle heat. When dissolved rub into the mixture 1 ounce of burnt sienna in powder, using the back of a spoon for this purpose. When cold, bottle for use.

Blackening Brass.—Make two solutions: Copper nitrate, 200 grains; water, 1 ounce. Silver nitrate, 200 grains; water, 1 ounce. Mix the solutions; clean the article well; dip it in the solution for a moment; withdraw it; dry it; and heat it strongly.

Black, Dead, for Wood.—Shellac, 40 parts; borax, 20 parts; glycerine, 20 parts; water, 500 parts. When dissolved, add 50 parts aniline black.

Cleaning Greasy Bottles.—Wash with benzine, or permanganate of potassium, to which has been added some hydrochloric acid.

Bottles that have contained resinous substances, wash with potash or soda and rinse with alcohol. Bottles that have contained essences, wash with sulphuric acid, then with water.

Clearing Stained Negatives.—Dissolve 1/8 ounce of pulverized alum in 20 ounces of water and add 1 dram of sulphuric acid. Immerse the stained plate in this solution for a few minutes; remove plate, wash, and then set in the rack to dry.

Film: to Remove from Glass: Make two solutions. A.—Sodium fluoride, 6 grains; water, 4 ounces.

B.—Sulphuric acid, 6 drops; water, 1 ounce. Place the negative in solution A for 2 minutes and then place directly in solution B. After another 2 minutes lift the film with the finger from one corner of the plate. It will soon leave the glass.

Firelight Effects on Developing Paper (H. S. Hood). No. 1.—Water, 5 drams; copper sulphate, 10 per cent. solution, 15 minims; ammonium carbonate, 10 per cent. solution. Add till precipitate first formed is redissolved.

No. 2.—Water, 4½ ounces; potassium ferricyanide, 6/10 drams. Mix separately and add No. 2 to No. 1. The print will turn bright red. Wash well.

Ground Glass: Substitutes for. 1.—Paraffine wax makes an excellent substitute for ground glass if the latter should get broken. Iron the paper onto a sheet of plain glass. It is more transparent than the focusing screen and the image will appear clearer; hence, in exposing allowance must be made for the difference in illumination.

2.—Resin dissolved in wood alcohol and blown over the glass; this must not be scratched; it gives a very fine-grained ground glass effect.

3.—White wax, 120 grains; ether, 1 ounce.

Ground Glass Varnish: Sandarac, 90 grains; mastic, 20 grains; ether, 2 ounces. Dissolve the resins in the ether and add benzole ½ to 1½ ounces.

Lens: to Clean.—The lens should always be kept free from dust or other impurities. To clean it, spread upon a table a clean sheet of paper; take the lens apart, and with a camel-hair brush dust each of the combinations on both sides. If the surfaces of the lenses are very dirty and have lost their polish, make up the following: Nitric acid, 3 drops; alcohol, 1 ounce; distilled water, 2 ounces. Dip a tuft of filtering cotton in this solution, rub each side of the lens, then polish with an absolutely clean chamois. Clean the lens tube before replacing the lenses, each of which should be finally dusted with a camel-hair brush.

Moonlight Effects on Developing Paper (H. S. Hood).—Immerse in water, 5 ounces; ferric ammonium citrate, 12 grains; potassium ferricyanide, 12 grains; nitric acid, 2/5 drams. Prints will assume a blue color. Wash until whites become clear.

Mounting Without Cockling (W. S. Davis).—Coat back of dry print with as strong a solution of warm gelatine (pure table gelatine will do) as can be spread easily. Allow to dry, then attach to mount by dampening the mount with water, then lay print in desired position; cover with a sheet of bond or smooth paper, and apply a warm flat iron until the gelatine melts. Very effective for thin mounting material, as there is no cockling if the mount contains just the right amount of water when the iron is applied.

Non-Abrasion Soda Mixture (M. G. Lovelace).—Sulphite of soda, 1 ounce; carbonate of soda, 370 grains; hypo, 8 grains. A mixture in these proportions may be used in place of sodas for paper; or carbonate of soda, 28.75 grams; hypo, 38.75 grams; water to 500.00 c.c.

Paste, Starch (A. Lomax). Powdered starch, 1 ounce; cold water, 12 ounces. Mix smooth with a glass rod, heat to boiling point. Boil half a minute stirring all the time. Use cold.

Poisons and Antidotes.—Administer the antidote as soon as possible. If a strong acid or alkali, or cyanide of potassium, has been swallowed, lukewarm water in large quantities should be swallowed at once. Where strong acids or alkalies have not been swallowed, rid the stomach of the poison by vomiting; for this purpose take 25 grains of zinc sulphate in warm water.

Polished Surfaces: to Photograph.—Smear the surface with soft putty so as to deaden the reflections. Photograph the article against a black background, and stop off all reflections, allowing the light to come from one direction only. To photograph hollow cut glassware fill with ink or aniline black water dye. Before photographing machinery deaden the bright parts with putty.

Safe Light for Panchromatic Plates.—Take old dry plates and coat with the following: Water, 10 ounces; tartrazine, 75 grains; patent blue A, 75 grains; naphthol greens, 75 grains; sulphuric acid, 30 minims. Stain the plates as deeply as possible. Use two plates.

Stains: to Remove from the Hands.—Developer stains: solution of citric or oxalic acid. Silver nitrate stains: Water, 4 ounces; chloride of lime, 350 grains; sulphate of soda, 1 ounce. Apply with a brush.

Tarnished Daguerreotypes, to Restore.—Remove the silvered plate from the case and place it, image uppermost, under a box lid or other protector from dust, etc. Put a small piece of potassium cyanide into a graduate and pour over it 1 or 2 ounces of water. Hold the daguerreotype by the corner with a pair of pliers, rinse it in clear running water, then pour over it the weak cyanide solution (a 3 per cent. solution is usually employed), and return it to the graduate. Repeat this operation several times until the discoloration quite disappears. Wash well in running water, and then, before the surplus water has time to collect in tears upon the image, begin to dry the plate gradually over a spirit lamp, holding the plate in an inclined position so that it will dry from the uppermost corner. The secret of success is in the use of pure water for the final washings and the drying of the image without check or the formation of tears.

Test for Hypo: Potassium permanganate, 2 grains; potassium carbonate, 20 grains; distilled water, 40 ounces. Soak the plate or print to be treated in water for one hour, then remove and add to the water a few drops of the above solution, which will turn a greenish yellow or brown if the water is not free from hypo.

To Flatten Double-weight Prints (George D. Jopson). A—9 ounces boiling water; ½ ounce gelatine. B—3 ounces boiling water; ½ drachm alum. C—2 drachms oil of cloves. Mix and strain through cheese cloth while hot. To use take a little from the stock and place in a cup. Place cup in hot water until backing is dissolved. Apply very thin to back of print with soft cloth or a tuft of cotton.

UNITED STATES WEIGHTS AND MEASURES

According to Existing Standards

LINEAR

	Inches		Feet		Yards		Rods		Fur's		Mi.
12 inches = 1 foot.	12	=	1								
3 feet = 1 yard.	36	=	3	=	1						
5.5 yards = 1 rod.	198	=	16.5	=	5.5	=	1				
40 rods = 1 furlong.	7,920	=	660	=	220	=	40	=	1		
8 furlongs = 1 mile.	63,360	=	5,280	=	1,760	=	320	=	8	=	1

SURFACE—LAND

	Feet		Yards		Rods		Roods		Acres
144 sq. ins. = 1 sq. ft.									
9 sq. ft. = 1 sq. yd.	9	=	1						
30.25 sq. yds. = 1 sq. rod.	272.25	=	30.25	=	1				
40 sq. rods = 1 sq. rood.	10,890	=	1,210	=	40	=	1		
4 sq. roods = 1 acre.	43,560	=	4,840	=	160	=	4	=	1
640 acres = 1 sq. mile.	27,878,400	=	3,097,600	=	102,400	=	2,560	=	640

VOLUME—LIQUID

	Gills		Pints		Gallon		Cub. In.
4 gills = 1 pint.	32	=	8	=	1	=	231
2 pints = 1 quart.							
4 quarts = 1 gallon.							

FLUID

Gallon		Pints		Ounces		Drachms		Minims		Cubic Centimetres
1	=	8	=	128	=	1,024	=	61,440	=	3,785,435
		1	=	16	=	128	=	7,680	=	473,179
				1	=	8	=	480	=	29,574
						1	=	60	=	3,697

16 ounces, or a pint, is sometimes called a fluid pound.

TROY WEIGHT

Pound		Ounces		Pennyweights		Grains		Grams
1	=	12	=	240	=	5,760	=	373.24
		1	=	20	=	480	=	31.10
				1	=	24	=	1.56

APOTHECARIES' WEIGHT

lb. Pound		℥ Ounces		ʒ Drachms		℈ Scruples		gr. Grains		Grams
1	=	12	=	96	=	288	=	5,760	=	373.24
		1	=	8	=	24	=	480	=	31.10
				1	=	3	=	60	=	3.89
						1	=	20	=	1.30
								1	=	.06

The pound, ounce, and grain, are the same as in Troy weight.

AVOIRDUPOIS WEIGHT

Pound		Ounces		Drachms		Grains (Troy)		Grams
1	=	16	=	256	=	7,000	=	453.60
		1	=	16	=	437.5	=	28.35
				1	=	27.34	=	1.77

ENGLISH WEIGHTS AND MEASURES

APOTHECARIES' WEIGHT

20 Grains	=	1 Scruple	=	20 Grains.
3 Scruples	=	1 Drachm	=	60 Grains.
8 Drachms	=	1 Ounce	=	480 Grains.
12 Ounces	=	1 Pound	=	5,760 Grains.

FLUID MEASURE

60 Minims	=	1 Fluid Drachm
8 Drachms	=	1 Fluid Ounce
20 Ounces	=	1 Pint
8 Pints	=	1 Gallon

The above weights are usually adopted in formulas.

All Chemicals are usually sold by

AVOIRDUPOIS WEIGHT

27 11/32	Grains	=	1 Drachm	=	27 11/32	Grains
16	Drachms	=	1 Ounce	=	437½	Grains
16	Ounces	=	1 Pound	=	7,000	Grains

Precious Metals are usually sold by

TROY WEIGHT

24 Grains	=	1 Pennyweight	=	24 Grains
20 Pennyweights	=	1 Ounce	=	480 Grains
12 Ounces	=	1 Pound	=	5,760 Grains

NOTE.—An ounce of metallic silver contains 480 grains, but an ounce of nitrate of silver contains only 437½ grains.

UNITED STATES FLUID MEASURE

Gal.	Pints.	Ounces.	Drachms.	Mins.	Cub. In.	Grains.	Cub. C.M
1	= 8	= 128	= 1,024	= 61,440	= 231.	= 58,328.886	= 3,785.44
	1	= 16	= 128	= 7,680	= 28.875	= 7,291.1107	= 473.18
		1	= 8	= 480	= 1.8047	= 455.6944	= 29.57
			1	= 60	= 0.2256	= 56.9618	= 3.70

IMPERIAL BRITISH FLUID MEASURE

Gal.	Pints.	Ounces.	Drachms.	Mins.	Cub. In.	Grains.	Cub. C.M
1	= 8	= 160	= 1,280	= 76,800	= 277.27384	= 70,000	= 4,543.732
	1	= 20	= 160	= 9,600	= 34.65923	= 8,750	= 567.966
		1	= 8	= 480	= 1.73296	= 437.5	= 28.398
			1	= 60	= 0.21662	= 54.69	= 3.550

METRIC SYSTEM OF WEIGHTS AND MEASURES

MEASURES OF LENGTH

Denominations and Values		Equivalents in Use	
Myriameter	10,000 meters.	6.2137	miles.
Kilometer	1,000 meters.	.62137	mile, or 3,280 ft. 10 ins.
Hectometer	100 meters.	328.	feet and 1 inch.
Dekameter	10 meters.	393.7	inches.
Meter	1 meter.	39.37	inches.
Decimeter	1-10th of a meter.	3.937	inches.
Centimeter	1-100th of a meter.	.3937	inch.
Millimeter	1-1000th of a meter.	.0394	inch.

MEASURES OF SURFACE

Denominations and Values		Equivalents in Use	
Hectare	10,000 square meters.	2.471	acres.
Are	100 square meters.	119.6	square yards.
Centare	1 square meter.	1,550.	square inches

MEASURES OF VOLUME

Denominations and Values			Equivalents in Use	
Names	No. of Liters	Cubic Measures	Dry Measure	Wine Measure
Kiloliter or stere	1,000	1 cubic meter.	1.308 cubic yards.	264.17 gallons.
Hectoliter	100	1-10th cubic meter.	2 bu. and 3.35 pecks.	26.417 gallons.
Dekaliter	10	10 cubic decimeters.	9.08 quarts.	2.6417 gallons.
Liter	1	1 cubic decimeter.	.908 quart.	1.0567 quarts.
Deciliter	1–10	1-10th cubic decimeter.	6.1023 cubic inches.	.845 gill.
Centiliter	1–100	10 cubic centimeters	.6102 cubic inch.	.338 fluid oz.
Milliliter	1–1000	1 cubic centimeter.	.061 cubic inch.	.27 fl. drm.

WEIGHTS

Denominations and Values			Equivalents in Use
Names	Number of Grams	Weight of Volume of Water at its Maximum Density	Avoirdupois Weight
Millier or Tonneau	1,000,000	1 cubic meter.	2204.6 pounds.
Quintal	100,000	1 hectoliter.	220.46 pounds.
Myriagram	10,000	10 liters.	22.046 pounds.
Kilogram or Kilo	1,000	1 liter.	2.2046 pounds.
Hectogram	100	1 deciliter.	3.5274 ounces.
Dekagram	10	10 cubic centimeters.	.3527 ounce.
Gram	1	1 cubic centimeter.	15.432 grains.
Decigram	1–10	1-10th of a cubic centimeter.	1.5432 grain.
Centigram	1–100	10 cubic millimeters.	.1543 grain.
Milligram	1–1000	1 cubic millimeter.	.0154 grain.

For measuring surfaces, the square dekameter is used under the term of ARE; the hectare, or 100 ares, is equal to about 2½ acres. *The unit of capacity* is the cubic decimeter or LITER, and the series of measures is formed in the same way as in the case of the table of lengths. The cubic meter is the unit of measure for solid bodies, and is termed STERE. *The unit of weight* is the GRAM, which is the weight of one cubic centimeter of pure water weighed in a vacuum at the temperature of 4 deg. Cent. or 39.2 deg. Fahr., which is about its temperature of maximum density. In practice, the term cubic centimeter, abbreviated c.c., is generally used instead of milliliter, and cubic meter instead of kiloliter.

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH MEASURE

1 cubic centimeter	= 17 minims				
2 cubic centimeters	= 34 "				
3 "	= 51 "				
4 "	= 68 "	or	1 dram	8 minims	
5 "	= 85 "		1 "	25 "	
6 "	= 101 "	"	1 "	41 "	
7 "	= 118 "	"	1 "	58 "	
8 "	= 135 "	"	2 drams	15 "	
9 "	= 152 "	"	2 "	32 "	
10 "	= 169 "	"	2 "	49 "	
20 "	= 338 "	"	5 "	38 "	
30 "	= 507 "	"	1 ounce	0 dram	27 minims
40 "	= 676 "	"	1 "	3 drams	16 "
50 "	= 845 "	"	1 "	6 "	5 "
60 "	= 1014 "	"	2 ounces	0 "	54 "
70 "	= 1183 "	"	2 "	3 "	43 "
80 "	= 1352 "	"	2 "	6 "	32 "
90 "	= 1521 "	"	3 "	1 "	21 "
100 "	= 1690 "	"	3 "	4 "	10 "
1000 "	= 1 liter =		35 "	1 "	40 "

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH WEIGHT

The following table, which contains no error greater than one-tenth of a grain, will suffice for most practical purposes:

1 gram	= 15⅖ grains.			
2 grams	= 30⅘ "			
3 "	= 46⅕ "			
4 "	= 61⅘ "	or	1 dram	1⅘ grain
5 "	= 77⅕ "	"	1 "	17⅕ grains
6 "	= 92⅗ "	"	1 "	32⅗ "
7 "	= 108 "	"	1 "	48 "
8 "	= 123⅖ "	"	2 drams	3⅖ "
9 "	= 138⅘ "	"	2 "	18⅘ "
10 "	= 154⅖ "	"	2 "	34⅖ "
11 "	= 169⅘ "	"	2 "	49⅘ "
12 "	= 185⅕ "	"	3 "	5⅕ "
13 "	= 200⅗ "	"	3 "	20⅗ "
14 "	= 216 "	"	3 "	36 "
15 "	= 231⅖ "	"	3 "	51⅖ "
16 "	= 247 "	"	4 "	7 "
17 "	= 262⅖ "	"	4 "	22⅖ "
18 "	= 277⅘ "	"	4 "	37⅘ "
19 "	= 293⅕ "	"	4 "	53⅕ "
20 "	= 308⅗ "	"	5 "	8⅗ "
30 "	= 463 "	"	7 "	43 "
40 "	= 617⅕ "	"	10 "	17⅕ "
50 "	= 771⅗ "	"	12 "	51⅗ "
60 "	= 926 "	"	15 "	26 "
70 "	= 1080⅕ "	"	18 "	0⅕ "
80 "	= 1234⅗ "	"	20 "	34⅗ "
90 "	= 1389 "	"	23 "	9 "
100 "	= 1543⅕ "	"	25 "	43⅕ "
1000 "	= 1 kilogram = 32 oz., 1 dr., 12⅗ gr.			

THE ELEMENTS:

THEIR NAMES, SYMBOLS, AND ATOMIC WEIGHTS OXYGEN STANDARD.

Compiled by HENRY F. RAESS.

1915

Aluminum . . Al	27.10	
Antimony . . Sb	120.20	
Argon . . . . . . A	39.88	
Arsenic . . . . As	74.96	
Barium . . . . Ba	137.37	
Bismuth . . . . Bi	208.00	
Boron . . . . . . B	11.00	
Bromine . . . . Br	79.92	
Cadmium . . . Cd	112.40	
Caesium . . . . Cs	132.81	
Calcium . . . . Ca	40.07	
Carbon C	12.00	
Cerium . . . . Ce	140.25	
Chlorine Cl	35.46	
Chromium . . Cr	52.00	
Cobalt . . . . . Co	58.97	
Columbium . Cb	93.50	
Copper . . . . . Cu	63.57	
Dysprosium Dy	162.50	
Erbium . . . . Er	167.70	
Europium . . Eu	152.00	
Fluorine . . . . F	19.00	
Gadolinium . Gd	157.30	
Gallium . . . . Ga	69.90	
Germanium . Ge	72.50	
Glucinum . . . Gl	9.10	
Gold . . . . Au	197.20	
Helium . . . . . He	3.96	
Holmium . . . . . Ho	163.50	
Hydrogen . . . . H	1.008	
Indium . . . . In	114.80	
Iodine I	126.92	
Iridium . . . . . . Ir	193.10	
Iron . . . . Fe	55.84	
Krypton . . . . . . Kr	82.92	
Lanthanum . . . La	139.00	
Lead . . . . Pb	207.10	
Lithium Li	6.94	
Lutecium . . . . . Lu	174.00	
Magnesium . . . Mg	24.32	
Manganese . . . Mn	54.93	
Mercury . . . . . Hg	200.60	
Molybdenum . Mo	96.00	
Neodymium . . Nd	144.30	
Neon . . . . Ne	20.20	
Nickel . . . . Ni	58.68	
Niton . . . . Nt	222.40	
Nitrogen . . . . . N	14.01	
Osmium . . . . . . Os	190.90	
Oxygen . . . . . . O	16.00	
Palladium . . . . Pd	106.70	
Phosphorus . . P	31.04	
Platinum . . . . . Pt	195.20	
Potassium . . . . K	39.10	
Praseodymium Pr	140.60	
Radium . . . . . . Ra	226.40	
Rhodium . . . . Rh	102.90	
Rubidium . . . Rb	85.45	
Ruthenium . . Ru	101.70	
Samarium . . . Sa	150.40	
Scandium . . . . Sc	44.10	
Selenium . . . . Se	79.20	
Silicon . . . . . . Si	28.30	
Silver . . . . Ag	107.88	
Sodium . . . . . Na	23.00	
Strontium . . . Sr	87.63	
Sulphur . . . . . S	32.07	
Tantalum . . . Ta	181.50	
Tellurium . . . Te	127.50	
Terbium . . . . Tb	159.20	
Thallium . . . . Tl	204.00	
Thorium . . . . Th	232.40	
Thulium . . . . Tm	168.50	
Tin . . . . Sn	119.00	
Titanium . . . . Ti	48.10	
Tungsten . . . . W	184.00	
Uranium . . . . U	238.50	
Vanadium . . . V	51.00	
Xenon . . . . . . Xe	130.20	
Ytterbium . . . Yb	173.50	
Yttrium . . . . . Yt	89.00	
Zinc . . . . Zn	65.37	
Zirconium . . . Zr	90.60	

TABLE OF COMPARATIVE PLATE SPEED NUMBERS

H & D	Watkins P No.	Wynne F No.	H & D	Watkins P No.	Wynne F No.
10	15	24	220	323	114
20	30	28	240	352	120
40	60	49	260	382	124
80	120	69	280	412	129
100	147	77	300	441	134
120	176	84	320	470	138
140	206	91	340	500	142
160	235	103	380	558	150
200	294	109	400	588	154

The above Watkins and Wynne numbers are equivalent to the H and D, only when the latter is determined in accordance with the directions of Hurter and Driffield, that is with pyro-soda developer and using the straight portion only of the density curve.

To convert H and D into Watkins: Multiply H and D by 50 and divide by 34. For all practical purposes the Watkins P number is 1½ times H and D.

To convert Watkins into Wynne F Nos.: Extract the square root and multiply by 6.4.

The above methods have been approved by the Watkins Meter Company and the Infallible Exposure Meter Company.

TABLE OF SOLUBILITIES OF THE MORE COMMON CHEMICALS USED IN PHOTOGRAPHY

Sol.—Soluble. V.S.—Very Soluble. S.S.—Slightly Soluble.
Dec.—Decomposed. Insol.—Insoluble.

One Part is Soluble in—Parts of Water

	Cold	Hot
Acetone, Sulphite	1	..
Acid, Citric	0.75	0.50
Acid, Gallic	100	0.3
Acid, Oxalic	9	0.3
Acid, Pyrogallic	2	V.S.
Acid, Tannic	0.6	..
Acid, Tartaric	0.75	.5
Alum	8	.25
Alum, Chrome	6	Dec.
Aluminum, Chloride	0.25	V.S.
Amidol	4	V.S.
Ammonium, Bichromate	5	.25
Ammonium, Bromide	1.3	0.7
Ammonium, Carbonate	4	Dec.
Ammonium, Citrate	0.5	V.S.
Ammonium, Iodide	0.75	V.S.
Ammonium, Nitrate	1	V.S.
Ammonium, Persulphate	1.5	Dec.
Ammonium, Sulphocyanide	0.6	V.S.
Borax	12.5	2
Cadmium, Bromide	1	V.S.
Cadmium, Chloride	0.7	V.S.
Cadmium, Iodide	1	.75
Caustic Potash—Pot. Hydrate	0.5	.25
Caustic Soda—Soda Hydrate	1.5	.5
Copper, Chloride	1	.75
Copper, Sulphate	3	1
Edinol	1	5
Gold, Chloride	V.S.	V.S.
Hydroquinone	17	..
Ferric, Chloride	0.75	.5
Ferric, Amm. Citrate	4	..
Ferric, Potassium Oxalate	15	0.85
Ferric, Sodium Oxalate	1.69	0.55
Ferrous, Sulphate	1.5	.05
Ferrous, Oxalate	Insol.	..
Lead, Acetate	2	1
Lead, Nitrate	2	.7
Mercury, Bichloride	18	2
Metol	Sol.	
Ortol	Sol.	

One Part is Soluble in—Parts of Water

	Cold	Hot
Potassium, Bicarbonate	3.5	Dec.
Potassium, Bichromate	10	1
Potassium, Bromide	1.5	1
Potassium, Carbonate	.9	0.50
Potassium, Chloroplatinite	6	V.S.
Potassium, Cyanide	1	0.5
Potassium, Ferricyanide	2.5	1.3
Potassium, Ferrocyanide	3	1.5
Potassium, Iodide	0.75	0.5
Potassium, Metabisulphite	Sol.	Dec.
Potassium, Oxalate	3	2
Potassium, Permanganate	16	10
Potassium, Persulphate	50	Dec.
Potassium, Sulphocyanide	1	0.5
Pyrocatechin	1.25	V.S.
Rochelle Salt	1.5	V.S.
Silver, Nitrate	.75	.25
Sodium, Acetate	3	.5
Sodium, Bicarbonate	12	Dec.
Sodium, Bisulphite	V.S.	..
Sodium, Bromide	1.25	1
Sodium, Carbonate (dry)	6	2.2
Sodium, Carbonate (crys't)	1.5	V.S.
Sodium, Chloride	3	2.5
Sodium, Citrate	1	.5
Sodium, Hyposulphite	1.5	1
Sodium, Iodide	.5	.3
Sodium, Phosphate	6.7	1
Sodium, Sulphide	V.S.	V.S.
Sodium, Sulphite (dry)	4	2
Sodium, Sulphite (crys't)	2.2	1
Sodium, Tungstate	8–12	S.
Uranium, Chloride	V.S.	V.S.
Uranium, Nitrate	.5	.25
Uranium, Sulphate	.5	.25

CHERRIES. Jared A. Gardner.

TABLE FOR CALCULATING DISTANCES IN ENLARGING OR REDUCING

From The British Journal Photographic Almanac

Focus of Lens	Times of Enlargement and Reduction							
Inches	1 Inch	2 Inches	3 Inches	4 Inches	5 Inches	6 Inches	7 Inches	8 Inches
2..........	4 4	6 3	8 2 2/3	10 2 1/2	12 2 2/5	14 2 1/3	16 2 2/7	18 2 1/4
2 1/2........	5 5	7 1/2 3 3/4	10 3 1/3	12 1/2 3 1/8	15 3	17 1/2 2 9/10	20 2 6/7	22 1/2 2 3/16
3..........	6 6	9 4 1/2	12 4	15 3 3/4	18 3 3/5	21 3 1/2	24 3 3/7	27 3 3/8
3 1/2........	7 7	10 1/2 5 1/4	14 4 2/3	17 1/2 4 3/4	21 4 1/5	24 1/2 4 1/12	28 4	31 1/2 3 9/10
4..........	8 8	12 6	16 5 1/3	20 5	24 4 4/5	28 4 2/3	32 4 4/7	36 4 1/2
4 1/2........	9 9	13 1/2 6 3/4	18 6	22 1/2 5 3/5	27 5 2/5	31 1/2 5 1/4	36 5 1/7	40 1/2 5 1/16
5..........	10 10	15 7 1/2	20 6 2/3	25 6 1/4	30 6	35 5 5/6	40 5 5/7	45 5 5/8
5 1/2........	11 11	16 1/2 8 1/4	22 7 1/3	27 1/2 6 4/5	33 6 1/2	38 1/2 6 5/12	44 6 2/7	49 1/2 6 3/16
6..........	12 12	18 9	24 8	30 7 1/2	36 7 1/5	42 7	48 6 6/7	54 6 3/4
7..........	14 14	21 10 1/2	28 9 1/3	35 8 3/4	42 8 2/5	49 8 1/6	56 8	63 7 7/8
8..........	16 16	24 12	32 10 2/3	40 10	48 9 3/5	56 9 1/3	64 9 1/7	72 9
9..........	18 18	27 13 1/2	36 12	45 11 1/4	54 10 4/5	63 10 1/2	72 10 2/7	81 10 1/8

The object of this table is to enable any manipulator who is about to enlarge (or reduce) a copy any given number of times to do so without troublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accurately from its optical center. The use of the table will be seen from the following illustration: A photographer has a *carte* to enlarge to four times its size, and the lens he intends employing is one of 6 inches equivalent focus. He must therefore look for 4 on the upper horizontal line and for 6 on the first vertical column and carry his eye to where these two join, which will be 30-7½. The greater of these is the distance the sensitive plate must be from the center of the lens; and the lesser, the distance of the picture to be copied. To *reduce* a picture any given number of times, the same method must be followed; but in this case the greater number will represent the distance between the lens and the picture to be copied, the latter that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction.

If the focus of the lens be 12 inches, as this number is not in the column of focal lengths, look out for 6 in this column and multiply by 2, and so on with any other numbers.

TABLES OF DISTANCES AT AND BEYOND WHICH ALL OBJECTS ARE IN FOCUS WHEN SHARP FOCUS IS SECURED ON INFINITY

Focal Length of Lens in Inches	Ratio marked on Stops													
	f/4	*f*/5.6	*f*/6	*f*/7	*f*/8	*f*/10	*f*/11	*f*/15	*f*/16	*f*/20	*f*/22	*f*/32	*f*/44	*f*/64
	Number of feet after which all is in focus													
4	33	24	22	19	17	13	12	9	8	7	6	4	3	2
4¼	38	27	25	21	19	15	14	10	10	7	7	5	3½	2½
4½	42	30	28	24	21	17	15	11	11	8½	7½	5½	4	3
4¾	47	34	31	27	24	19	17	12	12	9½	8½	6	5	3
5	52	36	35	30	26	21	19	14	13	10½	9½	6½	5½	3½
5¼	57	40	38	33	28	23	21	15	14	11½	10½	7	5½	3½
5½	63	45	43	36	31	25	23	17	15	12½	11½	7½	6	4
5¾	68	50	46	38	34	27	25	18	17	13½	13	8½	6½	4
6	75	54	50	42	38	30	28	20	19	15	14	9	7	4½
6¼	81	58	54	46	40	32	29	22	20	16	15	10	7½	5
6½	87	62	58	50	44	35	32	23	22	17½	16	11	8	5½
6¾	94	67	63	54	47	38	34	25	24	19	17	12	8½	6
7	101	72	68	58	51	40	37	27	25	20	18	12½	9	6
7¼	109	78	73	62	54	44	39	29	27	22	20	13½	10	6½
7½	117	83	78	64	58	47	42	31	29	24	21	14½	10½	7
7¾	124	90	83	71	62	50	45	33	31	25	22	15½	11	7½
8	132	96	88	76	68	52	48	36	32	28	24	16	12	8
8¼	141	100	94	80	71	56	51	37	35	29	25	17½	12½	8½
8½	150	104	100	84	76	60	56	40	38	30	27	19	13½	9
8¾	156	111	104	89	78	63	57	42	39	32	29	20	14	10
9	168	120	112	96	84	67	61	45	42	34	31	21	15	10½
9¼	180	127	116	101	90	71	65	47	45	35	32	22	16	11
9½	190	133	125	107	95	75	68	50	47	37	34	24	17	12
9¾	197	141	131	113	99	79	72	52	50	39	36	25	18	12½
10	208	148	140	120	104	83	75	55	52	42	38	26	19	13

If sharp focus is secured on any of the distances shown, then, with the stop indicated all objects are in focus from half the distance focused on up to infinity.

LENGTH OF STUDIO

REQUIRED FOR LENSES OF DIFFERENT FOCAL LENGTHS FROM 6 TO 8 FEET IS ALLOWED FOR THE CAMERA AND OPERATOR

From "Photographic Lenses" by BECK and ANDREWS

Focus of Lens	Size	Kind of Portrait	Length of Studio	Dist. of Lens from Object
Inches			In Feet	In Feet
6	Carte de Visite 3¼x4¼	Full Length	18 to 20	11 to 12
7½	Carte de Visite	Full Length	22 to 25	14 to 15
8½	Carte de Visite	Full Length Bust	24 to 28 10 to 15	17 to 19 5
9½	Cabinet and smaller groups	Full Length Bust	20 to 23 12 to 17	12 to 13 7
11	Cabinet and 5x7 groups	Full Length Bust	25 to 30 13 to 20	17 to 18 8
14½	Cabinets, panels and 6½x8½ groups	Full Length Bust	32 to 40 14 to 20	23 to 24 7
19	10x12 portraits or groups	Full Length Bust	20 to 25 14 to 20	13 7
24	16x20 portraits or groups	Full Length Bust	25 to 30 14 to 20	14 8

"UNIFORM SYSTEM" NUMBERS FOR STOPS FROM $\frac{f}{1}$ TO $\frac{f}{100}$.

In the following table Mr. S. A. Warburton calculated the exposure necessary with every stop from $\frac{f}{1}$ to $\frac{f}{100}$ compared with the unit stop of the "uniform system" of the Photographic Society of Great Britain. The figures which are underlined show in the first column what $\frac{f}{a}$ must be in order to increase the exposure in geometrical ratio from $\frac{f}{4}$, the intermediate numbers showing the uniform system number for any other aperture.

f	U. S. No.	f	U. S. No.	f	U. S. No.
1	1/16	15	14.06	58	210.25
1¼	.097	16	16	59	217.56
1.414	⅛	17	18.06	60	225.00
1½	.140	18	20.25	61	232.56
1¾	.191	19	22.56	62	240.25
2	¼	20	25.00	63	248.06
2¼	.316	21	27.56	64	256
2½	.390	22	30.25	65	264.06
2.828	½	22.62	32	66	272.25
2¾	.472	23	33.06	67	280.56
3	.562	24	36.00	68	289.00
3¼	.660	25	39.06	69	297.56
3½	.765	26	42.25	70	306.25
3¾	.878	27	45.56	71	15.06
4	1	28	49.00	72	324.00
4¼	1.12	29	52.56	73	333.06
4½	1.26	30	56.25	74	342.25
4¾	1.41	31	60.06	75	351.56
5	1.56	32	64	76	361.00
5¼	1.72	33	68.06	77	370.56
5½	1.89	34	72.25	78	380.25
5.656	2	35	76.56	79	390.06
5¾	2.06	36	81.00	80	400.00
6	2.25	37	85.56	81	410.06
6¼	2.44	38	90.25	82	420.25
6½	2.64	39	95.06	83	430.56
6¾	2.84	40	100.00	84	440.00
7	3.06	41	105.06	85	451.56
7¼	3.28	42	110.25	86	462.25
7½	3.51	43	115.56	87	473.06
7¾	3.75	44	121.00	88	484.00
8	4	45	126.56	89	495.06
8¼	4.25	45.25	128	90	506.25
8½	4.51	46	132.25	90.50	512
8¾	4.78	47	138.06	91	517.56
9	5.06	48	144.00	92	529.00
9¼	5.34	49	150.06	93	540.56
9½	5.64	50	156.25	94	552.25
9¾	5.94	51	162.56	95	564.06
10	6.25	52	169.00	96	576.00
11	7.56	53	175.56	97	588.06
11.31	8	54	182.25	98	600.25
12	9.00	55	189.06	99	612.56
13	10.56	56	196.00	100	625
14	12.25	57	203.06		

PHOTOGRAPHIC DEVELOPERS

Compiled and Arranged by

SAMUEL WEIN

COMMON NAME	CHEMICAL NAME	FORMULA
Adurol	Mono-brom-hydroquinone	$C_6H_3(OH)_2Br$
Adurol	Mono-chlor-hydroquinone	$C_6H_3(OH)_2Cl$
Amidol	Diamidophenol-hydrochloride	$C_6H_3(OH)\ (NH_2)_2 2HCl$
Citol	Paramidophenol (solution)	$C_6H_4OHNH_2$
Diamine	Diamidore sorcine-hydrochloride	$C_6H_2(OH)_2(NH_2)_2 2HCl$
Dianol	Diamidophenol-hydrochloride	$C_6H_3OH(NH_2)_2HCl$
Diogen	Sodium-alpha-amido-naphthol-disulphonic acid	$C_{10}H_4(OH)\ (NH_2)\ (SO_2Na)_2$
Diphenyl	Diamido-oxy-diphenyl-hydrochloride	$C_{12}H_7(NH_2)_2OH_2HCl$
Duitall	Paramidophenol sulphate	$C_6H_4OHNH_2\ H_2SO_4$
Edinol	Paramido-saligenin	$C_6H_3(CH_2OH)\ (OH)\ (NH_2)$
Eikonogen	Sodium-amido-beta-naphthol-mono-sulphonic acid	$C_{10}H_5(OH)\ (NH_2)\ (SO_3Na)2H_2O$
Elon	Mono-methyl-paramidophenol-sulphate	$C_6H_4OHNH_2(H_3)_2H_2SO_4$
Emergol	Paramidophenol sulphate	$C_6H_4OHNH_2\ H_2SO_4$
Freedol	Paramidophenol sulphate	$C_6H_4OHNH_2\ H_2SO_4$
Glycine	Para-oxy-phenyl-glycocoll, amidoacetic acid	$C_6H_4OHNHCH_3COOH$
Hydramine	Hydroquinone and paraphenylenediamine (a mixture)	$C_6H_4(OH)_2C_6H_4(OH_2)_2$
Hydrazine	Hydrazine	$C_6H_5(NH_2)_2HCl$
Hydrol	Paramidophenol hydrochloride	$C_6H_4OHNH_2\ HCl$
Hydroquinone	Paradioxy-benzole	$C_6H_4(OH)$
Hydroxylamine	Oxy-ammonia	NH_2OH
Indianol	Paramidophenol (solution)	$C_6H_4OHNH_2$
Kachine	Ortho-dioxy-benzole	$C_6H_4(OH)_2$
Kathol	Paramidophenol sulphate	$C_6H_4OHNH_2\ H_2SO_4$
Kodelon	Paramidophenol hydrochloride	$C_6H_4OHNH_2\ HCl$
Metol	Mono-methyl-paramidophenol-sulphate	$C_6H_4OHNH_2CH_3)_2H_2SO_4$
Metol	Methyl-paramido-meta-cresol-sulphate	$C_6H_3CH_3NH_2CH_3)_2(H_2SO_4)$
Metoquinone	Metol and hydroquinone (a mixture)	$C_6H_4OHNH_2CH_3)_2H_2SO_4C_6H_4(OH)_2$
Ortol	Methyl-amidophenol and hydroquinone (a mixture)	$C_6H_4(OH)\ (NHCH_3HCl)$
Para	Paramidophenol	$C_6H_4OHNH_2$
Paramidophenol	Paramidophenol (citrate; hydrochloride; sulphate)	$C_6H_4OHNH_2$
Paramol	Paramidophenol (solution)	$C_6H_4OHNH_2$
Paranol	Ortho-amido-meta-hydroxyl-benzyl-alcohol	$C_6H_3(OH)\ (CH_2OH)\ NH_2$
Paraphenylenediamine	Paraphenylenediamine	$C_6H_4(OH_2)_2$
Pyrocatechin	Ortho-dihydroxy-benzole	$C_6H_4(OH)_2$
Pyrogallol	Tri-oxy-benzole	$C_6H_3(OH)_3$
Photol	Mono-methyl-paramidophenol-sulphate	$C_6H_4OHNH_2CH_3)_2H_2SO_4$
Quinomet	Metol and hydroquinone (a mixture)	$C_6H_4OHNH_2CH_3)_2H_2SO_4C_6H_4(OH)_2$
Reducin	Tri-amidophenol-hydrochloride	$C_6H_2(OH)\ (NH_2)_3 3HCl$
Rodinal	Paramidophenol (solution)	$C_6H_4OHNH_2$
Satrapol	Mono-methyl-paramidophenol-sulphate	$C_6H_4OHNH_2CH_3)_2H_2SO_4$
Scalol	Mono-methyl-paramidophenol-sulphate	$C_6H_4OHNH_2CH_3)_2H_2SO_4$
Synthol	Diamido-orcinol-hydrochloride	$C_6H_4(CH_3)\ (OH)_2(NH\ HCl)_2$
Unal	Paramidophenol	$C_6H_4OHNH_2$

American Photographic Societies

This list is compiled from information received from an inquiry form sent to the societies during the latter half of 1917. It includes many societies not given in the 1917 Annual, but falls short of completeness as a record of the photographic societies of America. Secretaries of societies not here listed are urged to send us particulars of their organization so that the list may be fully representative of society activities.—Editor.

AMERICAN INSTITUTE PHOTOGRAPHIC SECTION—New York City. Headquarters, 322-324 West 23d Street. Established March 26, 1859. Stated meetings, first and third Mondays of each month. No meetings during Summer months. *Chairman,* Oscar G. Mason; *Vice-Chairman,* Robert A. B. Dayton; *Treasurer,* James Y. Watkins; *Secretary,* John W. Bartlett, M.D., F.R.P.S., 149 West 94th Street.

AMERICAN LANTERN SLIDE INTERCHANGE—New York. Principal office, 233 Broadway. Organized 1885. *General Manager,* F. C. Beach. Membership, 15 clubs. *Board of Managers,* F. C. Beach, New York; H. W. Schonewolf, Buffalo, N. Y.; O. C. Reiter, Pittsburg, Pa.; S. S. Johnson, Orange, N. J.; W. H. Rau, Philadelphia, Pa. Annual meeting, January of each year.

BERKSHIRE PHOTOGRAPHIC SOCIETY—Pittsfield, Mass. Headquarters, 34 North Street. *President,* Edwin H. Lincoln; *Chairman,* Henry E. Robbins; *Treasurer,* Martha P. Langley; *Director of Portfolios,* Frederick D. Burt (all of Pittsfield, Mass.) Portfolios of prints circulated monthly with contributions and criticisms by each member.

BOSTON CAMERA CLUB—Boston, Mass. Established 1881. Incorporated 1886. Membership, 75. *President,* P. Hubbard; *Secretary,* John H. Thurston, 50 Bromfield Street.

BOSTON PHOTO CLAN—Organized July, 1911. Headquarters, The Garo Studio, 739 Boylston Street. Membership 9.

BOSTON YOUNG MEN'S CHRISTIAN UNION CAMERA CLUB—Boston, Mass. Headquarters, 48 Boylston Street, Boston. Organized 1908. *President,* Wesley E. Burwell; *Vice-President,* William E. Howard; *Treasurer,* H. C. Channen; *Secretary,* Louis Astrella. Meetings first Tuesday each month at club rooms, 48 Boylston Street.

BRITISH COLUMBIA AMATEUR PHOTOGRAPHIC SOCIETY—Orpheum Building, Vancouver, Canada. Organized May 1, 1914. *Secretary-Treasurer,* C. James Duncan. Meetings every Monday evening.

BUFFALO CAMERA CLUB—Buffalo, N. Y. Headquarters, Kinne Building, corner Main and Utica Streets. Annual election of officers, fourth Thursday in April; regular meeting nights, second and fourth Tuesdays of each month. *President,* Hugh Kerr Thomas; *Vice-President,* Claude L. Moore; *Secretary,* Ward L. Conklin, 49 Niagara Street.

CALIFORNIA CAMERA CLUB—San Francisco, Cal. Headquarters, 833 Market Street, San Francisco. Established March 18, 1890. Incorporated April 5, 1890. Membership, 304. Date of meeting, second Tuesday, monthly. Date of annual exhibition, no set time. *President,* Wm. C. Mackintosh; *Secretary,* John R. Douglass.

CAMERA CLUB—New York. Headquarters, 121 West 68th Street. Established by consolidation of Society of Amateur Photographers and New York Camera Club in April, 1896. Incorporated May 7, 1896. Membership, 200. Date of annual meeting, first Thursday after the first Monday in January. *Secretary,* Monroe W. Tingley.

CAMERA CLUB OF CINCINNATI—Cincinnati, Ohio. Headquarters, Seventh and Walnut Streets. Established February 26, 1913. Date of meetings, 1st and 16th of each month, except when said dates fall on Sunday; then on the following Monday. *President,* Charles H. Partington; *Secretary and Treasurer,* G. A. Ginter.

CAMERA CLUB OF DETROIT. Club Rooms 513-15 Kresge Building, W. Grand Circus Park, Detroit. Organized April, 1915. Membership, 60 (active). Annual meeting for election of officers, first Monday in October. *President,* Dr. Oscar E. Fischer, 507 Field Avenue, Detroit. Address correspondence to Dr. Fischer.

CAMERA CLUB OF HARTFORD—Hartford, Conn. Membership, 15. *President,* Dr. Frederic S. Crossfield, 75 Pratt Street; *Vice-President,* Clayton P. Chamberlain; *Corresponding Secretary,* Eugene D. Field; *Treasurer,* A. L. Chase; *Secretary,* Mr. Charles R. Nason, 20 Madison Street.

CAMERA CLUB OF THE TWENTY-THIRD STREET BRANCH, Y. M. C. A.—New York. Headquarters, 23d Street Y. M. C. A. Established June 3, 1904. Membership, 65. Date of business meetings, second Tuesday in each month. *President,* Wm. J. Guy; *Acting Secretary,* Ernest A. Heckler, 215 West 23d Street; *Treasurer,* F. W. Grunwold. Date of annual exhibition, usually in January. No fixed date.

"CAMERADS"—New Brunswick, N. J., Headquarters, corner Church and George Streets. Established April 24, 1890. *Secretary,* Harvey Iredell, D.D.S., Lock Box 34, New Brunswick.

CAMERA PICTORIALISTS OF LOS ANGELES—Los Angeles, Cal. Headquarters, 415 Blanchard Building. Association formed for strictly pictorial work. Membership limited to 15. Meetings first Wednesday of month. *Director,* Louis Fleckenstein; *Correspondent,* David J. Sheahan.

CAPITAL CAMERA CLUB, INC.—Washington, D. C., 712 11th Street, N. W. Founded May 1, 1891. Annual meeting, first Thursday in May. *President,* Frederick L. Pittman; *Vice-President,* Charles A. Baker; *Secretary,* Rutland D. Beard; *Treasurer,* Thos. B. Gardner; *Librarian,* Mrs. W. B. McDevitt. Date of annual exhibition, March.

CENTRAL Y. M. C. A. CAMERA CLUB—Headquarters, 1421 Arch Street, Philadelphia, Pa. Club running for 21 years. Meetings, third Monday in month.

CHICAGO CAMERA CLUB—Chicago, Ill. Headquarters, 329 Plymouth Court. Established February 14, 1904. Incorporated February 19, 1904. Date of meetings, every Thursday. *President,* Jos. Simons; *Vice-President,* F. T. Farrell; *Secretary,* H. P. Parker, 329 Plymouth Court.

CHICAGO PHOTO FELLOWS—Chicago, Ill. Organized September 8, 1909. membership, 8. *Correspondent,* F. M. Tuckerman, 1109 Railway Exchange, Chicago.

CITY HALL CAMERA CLUB—Los Angeles, Cal. Headquarters, Room 502 Hosfield Building. Organized May 25, 1914. Membership, 24. *Correspondent,* W. C. Sawyer.

CLEVELAND PHOTOGRAPHIC SOCIETY—Cleveland, Ohio, 412 Superior Avenue, N. W. Established June 7, 1913. Permanent organization effected at meeting of June 18. Meetings every Wednesday. *Chairman,* Dr. H. B. Van Tress; *Secretary-Treasurer,* Stephen Domonkos.

COLUMBIA PHOTOGRAPHIC SOCIETY—Philadelphia, Pa. Headquarters, 2526 North Broad Street, Philadelphia. Established 1889. Incorporated July 3, 1894. Membership, 75. Business meeting first Monday of each month; other Mondays, lectures or demonstrations. *President,* Dr. James S. Gallagher; *Vice-President,* H. E. Cassel; *Secretary,* C. F. Davis, 701 Eldridge Avenue, West Collingswood, N. J.; *Treasurer,* W. H. Post, Jr., Berwyn, Chester Co., Pa.

DARTMOUTH CAMERA CLUB—Headquarters, 7-8 Robinson Hall, Hanover, N. H. Organized, 1915. Membership, 28. *President,* Albert B. Street; *Vice-President,* Ivan Prowarttain; *Treasurer,* Donald Eldredge; *Secretary,* Walter S. Ross. All communications addressed to Prof. Leland Griggs, Hanover, N. H.

ELMIRA CAMERA CLUB—Elmira, N. Y. Headquarters, 116 Baldwin Street, Elmira. Established 1902. Membership, 30. Meets first Wednesday each month. *President,* George C. Wheeler; *Secretary-Treasurer,* Seely Stage, 706 Columbia Street.

ELYSIAN CAMERA CLUB—Hoboken, N. J. Headquarters, 307 Washington Street. Established 1902. Date of meetings, second Friday of each month. Membership, 50. *President,* Martin S. Crane; *Vice-President,* Adolph Geiger; *Treasurer,* Julius Nelson; *Secretary,* William F. Nelson, 590 Boulevard East, Weehawken, N. J.

ESSEX CAMERA CLUB—Newark, N. J. Headquarters, 872 Broad Street, Newark, N. J. Organized July, 1899. Membership, 40. Date of meetings, fourth Tuesday of every month. *President,* George A. Hardy; *Secretary,* L. F. Gebhardt, South 11th Street.

GRAND RAPIDS CAMERA CLUB—Grand Rapids, Mich. Headquarters, 2 Central Place, N. E. Established 1899. Meetings every Thursday evening from September to June. *President,* Lieut. W. M. Clarke; *Vice-President,* G. E. Fitch; *Secretary and Treasurer,* Miss L. C. Winegar, 831 Wealthy Street, S. E., Grand Rapids, Mich.

INTERNATIONAL PHOTOGRAPHIC ASSOCIATION—San Francisco, Cal. Founded 1908. *President,* F. B. Hinman, 1369 So. Washington Street, Denver, Col.; *Chief Album Director,* J. H. Winchell, R. F. D. No. 2, Painesville, Ohio; *General Secretary,* Fayette J. Clute, 413-415 Claus Spreckels Building, San Francisco; *Stereoscopic Album Director,* James B. Warner, 413-415 Claus Spreckels Building, San Francisco, Cal.; *Director Post Card Division,* Charles M. Smythe, 1160 Detroit Street, Denver, Col.; *Director Lantern-Slide Division,* George E. Moulthrope, Bristol, Conn.; *Secretary Lantern-Slide Division,* Edward F. Cowles, 11 Oak Street, Bristol, Conn. The *State Secretaries,* Alabama—Richard Hines, Jr., Barton Academy Building, Mobile. Alaska—P. S. Hunt, Anchorage. California—W. E. Thomson, 3211 School Street, Fruitvale, Cal. Colorado—O. E. Aultman, Plested Building, Trinidad. Connecticut—George E. Moulthrope, Bristol, Florida—Capt. E. S. Coutant, Box 73, Stuart. Georgia—L. O. Surles, P. O. Box 434. Cuthbert. Idaho—Eugene Clifford, 902 9th Avenue, Lewiston. Illinois—George A. Price, 320 N. Locust Street, Centralia. Indiana—H. E. Bishop. 1706 College Avenue, Indianapolis. Iowa—C. W. Parker, Mapleton. Kansas

—H. E. High, Box 232, Elsworth. Maryland—E. G. Hopper, 218 East 20th Street, Baltimore. Massachusetts—John Mardon, 161 Summer Street, Boston. Michigan—W. E. Ziegenfuss, M.D., 327 West Hancock Avenue, Detroit. Minnesota—Leonard A. Williams, St. Cloud. Mississippi—George W. Askew, Jr., 211 34th Avenue, Meridian. Missouri—Wharton Schooler, R. F. D. No. 2, Eolia. Nebraska—Miss Lou P. Tillotson, 822 South 38th Street, Omaha. New Hampshire—Mrs. A. Leonora Kellogg, Box 224, Londonderry. New York—Charles F. Rice, P. O. Box 517, Mamaroneck. New Jersey—Burton H. Albee, 103 Union Street, Hackensack. North Dakota—Jas. A. Van Kleeck, 619 Second Avenue, North Fargo. Ohio—J. H. Winchell, R. F. D. No. 2, Painesville. Pennsylvania—L. A. Sneary, 2822 Espy Avenue, Pittsburg. South Dakota—C. B. Bolles, L. B., 351 Aberdeen. Texas—J. B. Oheim, P. O. Drawer M, Henrietta. Utah—John C. Swenson, A.B., Provo. West Virginia—William E. Monroe, Box 298, Point Pleasant.

INTER-CITY CAMERA CLUB, PRINT EXCHANGE—Headquarters, Portland, Me. Membership, 8 cities. *Chairman,* Carl A. Jordan, 7 Wilney Avenue, Portland, Me.

KANSAS CITY CAMERA CLUB—Kansas City, Mo. *President,* Dr. A. H. Cordier; *Vice-President,* Wm. H. Spiller; *Secretary-Treasurer,* Dr. Maclay Lyon, Suite 501 Bryant Building. Club meets second Saturday of each month. Annual exhibition in October.

LITTLE ROCK CAMERA CLUB—Little Rock, Ark. Organized in spring, 1916. Limited membership. Advanced amateurs. Meets every two weeks. *President,* Dr. R. A. Tate, 5th & Main Streets; *Secretary,* Roderick Gallie, 411 W. 13th Street.

MISSOURI CAMERA CLUB—St. Louis, Mo. Club Rooms 706 Merchants-Laclede Building, 408 Olive Street. Organized November, 1903. Meetings, second and fourth Tuesday. *President,* Roland M. Homer; *Treasurer,* Frank M. White; *Acting Secretary,* Edwin Loker, 4326 Von Versen Avenue, St. Louis.

MONTREAL AMATEUR ATHLETIC ASSOCIATION CAMERA CLUB—Montreal, Canada. Headquarters, M. A. A. Building, 250 Peel Street. Organized May 1, 1906. *President,* Gordon K. Miller; *Vice-President,* P. F. Calcutt; *Treasurer,* R. E. Melville.

NEWARK CAMERA CLUB—59 Mechanic Street, Newark, N. J. Organized 1888. Incorporated 1910. *President,* David Bridge; *Vice-President,* Lyman Lee; *Treasurer,* L. Wright, Jr.; *Secretary,* Albert F. Quinlin. Membership, 90. Meetings, second and fourth Mondays in each month.

NEW BRITAIN CAMERA CLUB—Organized 1892. *President,* Geo. A. Weir; *Vice-President,* E. H. Start; *Secretary and Treasurer,* Paul A. Stahl, 104 So. Burritt Street, New Britain, Conn. Meets second and fourth Tuesdays, 173 Main Street.

NEW HAVEN CAMERA CLUB—739 Chapel Street. Organized 1911. Membership, 92. *President,* Bernard H. Walden; *Vice-President,* George M. Christy; *Secretary,* Frank R. Lawrence; *Treasurer,* J. R. Sheldon. Meetings held every Thursday. Business meetings, first Thursday in the month.

OAK PARK CAMERA CLUB—Oak Park, Ill. Organized February, 1915. Membership, 20. *Director,* D. C. Donaldson;; *President,* G. F. Chase; *Vice-President,* R. C. Close; *Secretary,* H. P. T. Matte; *Treasurer,* Mrs. A. R. Hanson; *Editor,* A. R. Hanson.

ORANGE CAMERA CLUB—East Orange, N. J. Headquarters, Main and Clinton Streets. Established March 21st, 1892. Incorporated May 19th, 1893. Membership, 100. Date of meetings, first and third Saturdays of each month, except July, August and September. *President,* Stephen S. Johnson; *Secretary,* Lindley W. Bode., Main and Clinton Streets, East Orange, N. J.

OREGON CAMERA CLUB—Portland, Ore., fifth floor Elks' Building. Established 1895. Incorporated 1903. Membership, 100. Date of meetings, second Tuesday in January. *President,* A. A. Bailey, Jr.; *Secretary,* Jacques Letz. Date of annual exhibition, October.

PHOTOGRAPHIC CLUB OF BALTIMORE CITY—Baltimore, Md. Headquarters, Maryland Academy of Sciences Building, 105 West Franklin Street. Established 1885. Incorporated 1890. Membership, active, 50. Date of meetings, every Tuesday. *President,* Arthur H. Goldsborough, 1904 Homewood Avenue; *Secretary,* D. Steiner Pouder, 904 N. Carey Street, Baltimore, Md. Date of annual exhibition, March.

PHOTOGRAPHIC GILD OF THE SOCIETY OF ARTS AND CRAFTS—Boston, Mass. Membership, active, 23; honorary, 2. Monthly exhibition. *Dean,* Clarissa Hovey; *Councillors,* Mrs. Irving Kimball, Alice Austin; *Secretary and Treasurer,* Florence Maynard.

PHOTO FELLOWS OF THE WORLD—*Dean,* Sigismund Blumann, 3217 Davis Street, Fruitvale, Cal. Membership by invitation only.

PHOTOGRAPHIC SOCIETY OF PHILADELPHIA—Philadelphia, Pa. Headquarters, 1615-1617 Sansom Street. Established November, 1862. Incorporated April 24, 1885. Membership, 130. Date of meetings: Members, second Wednesday. *President,* Henry P. Baily; *Secretary,* M. R. Witt, 1615 Sansom Street; *Treasurer,* Harold F. A. Starr. Date of members' annual exhibition, March. Members annual exhibit vacation work, in all media—November.

PHOTO SECESSION—New York City. Headquarters and galleries, 291 Fifth Avenue. Continuous exhibitions November-April. *Director,* Alfred Stieglitz.

PITTSBURGH-ACADEMY OF SCIENCE AND ART (PHOTOGRAPHIC SECTION)—Pittsburgh, Pa. Headquarters, Carnegie Institute, Schenley Park. Organized January 23, 1900. Membership, 100. Meetings, second and fourth Tuesdays of each month at Carnegie Institute. *President,* O. C. Reiter, 2424 Penn Avenue; *Vice-President,* R. D. Rypinski, *Secretary-Treasurer,* C. E. Beeson, 7th floor Union Arcade, Pittsburgh, Pa.; *Lantern Slide Director,* W. A. Dick, 910 Chislett Street; *Print Director,* S. A. Martin, 923 Chislett Street. Annual salon, Carnegie Art Gallery, March. Address all communications to C. E. Beeson, Secretary, 7th floor Union Arcade, Pittsburgh, Pa.

PITTSBURGH CAMERA CLUB—Pittsburgh, Pa. Established December, 1910. Membership, 25. *President,* Robert L. Sleeth, Jr.; *Treasurer,* William McK. Ewart, 2524 Center Avenue; Secretary, Charles W. Doutt, Crafton, Pa.

PITTSBURGH SALON OF PHOTOGRAPHIC ART—Pittsburgh, Pa. Under auspices of Photographic Section of the Academy of Science and Art. Membership consists of the leading pictorialists in the United States. *President,* O. C. Reiter, 2424 Penn Avenue, Pittsburgh, Pa.; *Secretary,* C. E. Beeson, 700 Union Arcade, Pittsburgh, Pa. Salon held Carnegie Institute, March. Last day of entry, February 9th.

PORTLAND CAMERA CLUB PHOTOGRAPHIC SECTION OF THE PORTLAND SOCIETY OF ART—Portland, Me. Headquarters, L. D. M. Sweat Memorial, Spring, corner High Street. Established, 1899. Membership, 90. Date of meetings, every Monday evening. *President,* Frank H. Faught; *Vice-President,* Rupert S. Lovejoy; *Secretary,* E. Roy Monroe. Date of annual exhibition, in March.

POSTAL PHOTOGRAPHIC CLUB—Headquarters, Washington, D. C. Established, December, 1888. Membership, 40. Date of meetings, no regular meeting. *President,* Charles E. Fairman; *Secretary,* Ernest L. Crandall, 1752 Euclid, N. W., Washington, D. C. Albums circulate among members monthly, except August and September.

PROVIDENCE CAMERA CLUB—Providence, R. I. Established 1883. Incorporated 1889. Headquarters, Commercial Building, 55 Eddy Street. Total membership, 100. Date of meetings, second Saturday of each month. *President,* H. Ladd Walford; *Vice-President,* Ernest F. Salisbury; *Secretary,* C. W. Morrill, 55 Eddy Street; *Treasurer,* G. Frederick Bohl.

ROCHESTER CAMERA CLUB—Rochester, N. Y. Headquarters, 123 West Main Street. *Board of Trustees*—Chairman, Jas. A. Kipp; Arthur Wygant, E. Shantz, W. J. Reddin; *Secretary-Treasurer,* Edw. A. Carroll, 417 Monroe Avenue, Rochester, N. Y.

SPRINGFIELD PHOTOGRAPHIC SOCIETY—Springfield, Mass. Meets in Central High School the second Wednesdays of every month except July and August. *President,* Dr. Albert J. Treiehler; *Vice-President,* Arthur P. Irving; *Secretary,* P. M. Tainter, Mittineague, Mass.; *Treasurer,* Mrs. K. A. Burdette; *Custodian,* Wm. A. Quigley; *Chairman of Executive Committee,* J. P. Bishop.

ST. LAWRENCE CAMERA CLUB—Ogdensburg, N. Y. Headquarters, 74 Caroline Street. Established 1900. Membership, 8. Date of meetings, at the call of the Secretary. *President,* Arthur L. Jameson; *Secretary,* John N. Brown, 74 Caroline Street.

ST. LOUIS CAMERA CLUB—St. Louis, Mo. Organized February 12, 1914. Devoted to the interest and advancement of the art of photography. Meetings every second and fourth Thursday at 8 p. m.; Central Public Library, 13th and Oliver Streets. *President,* Oscar C. Kuehn; *Vice-President,* Hector Updike; *Secretary,* S. F. Duckworth, 2845-A Accomac Street.

TOLEDO CAMERA CLUB—Toledo, Ohio. Member of the American Federation. Headquarters, Museum of Art. Meet second Wednesday of each month. *President,* John F. Jones; *Vice-President,* R. E. Ferguson; *Secretary,* Harry A. Webb, 1017 Prouty Avenue; *Treasurer,* M. W. Chapin.

TORONTO CAMERA CLUB—Toronto, Canada. In affiliation with the Royal Photographic Society of Great Britain. Established, 1887. Incorporated 1893. Headquarters, 2 Gould Street. Membership, 200. Date of meetings, every Monday, from October to April, inclusive. *President,* Chas. A. Coles; *Secretary-Treasurer,* Albert Kelly, 2 Gould Street. Date of annual exhibition, March, April or May.

TRINIDAD CAMERA CLUB—Trinidad, Colo. Established April 21, 1906. Meetings second Wednesday of every month at O. E. Aultman's Studio. Monthly competitions. *President,* W. L. Crouch; *Vice-President,* Wilber Davis; *Secretary and Treasurer,* W. Dearden, 717 Colorado Avenue. Member of American Lantern Slide Interchange.

WASHINGTON Y. M. C. A. CAMERA CLUB—Washington, D. C. Headquarters, Central Y. M. C. A. Building. Membership, 55. *President,* J. K. Schofield; *Vice-President and Treasurer,* W. L. Vetter; *Secretary,* F. H. Eldred.

WESLEY CAMERA CLUB—Headquarters, Bell Theatre Building. Organized April 6, 1912. Meeting the first Monday of each month. *President,* W. A. Drewelow; *Vice-President,* Halvor Flom; *Secretary and Treasurer,* Lawrence Burke (Wesley, Iowa).

YONKERS CAMERA CLUB—Yonkers, N. Y. Headquarters, Hollywood Inn Building. *President,* W. R. Cronk; *Vice-President,* H. B. Spreckels; *Secretary,* Elijah F. Munn; *Librarian,* C. B. Carling; *Trustees,* Dr. S. L. Jeffery, Wm. Beck, Wm. S. Mitchell.

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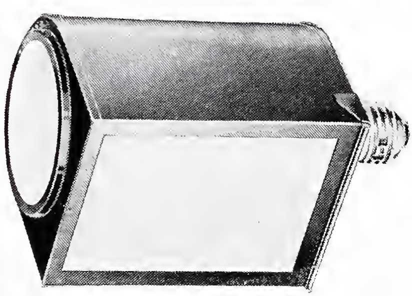

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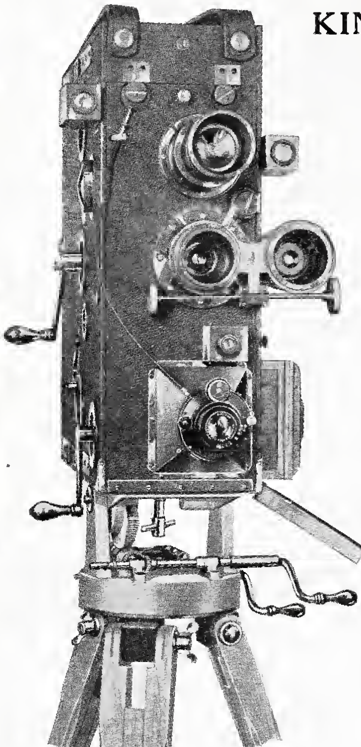

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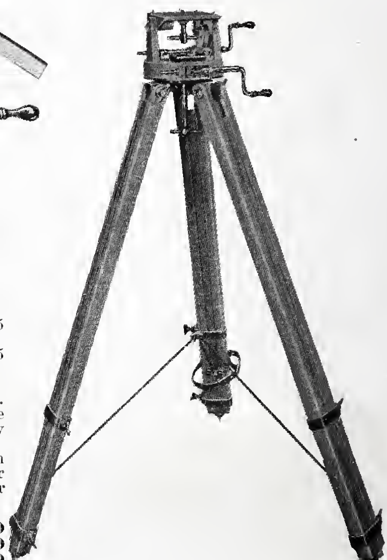

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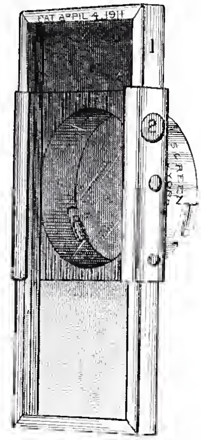

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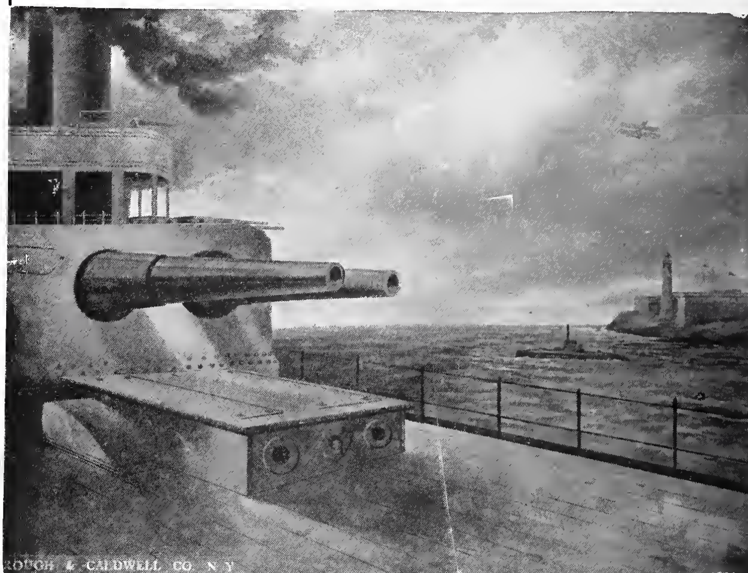

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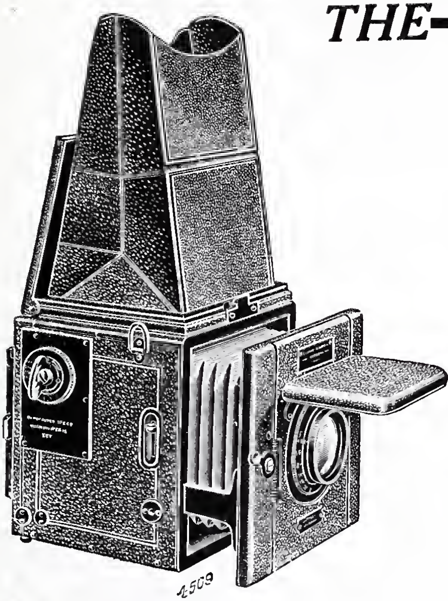

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